Datex

Datex AS/3™

Anesthesia Monitor

Operator's Manual

1995

Related to

Software Cartridge, S-STD94 and S-ARK94 Monitoring Functions

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ABOUT THIS MANUAL

General

This Operator's Manual describes all the functions offered by the Datex AS/3 Anesthesia Monitor. Some functions described may not be available in the monitor you are using.

All the functions and parameters described in this manual refer to the Software Cartridge S-STD94. If you are using an older software version the menus, displays and available functions may be somewhat different.

The new user of the Datex AS/3 Anesthesia Monitor should begin with chapter Short Instructions. This chapter describes the basic operation of the monitor.

Each parameter chapter describes how to use the parameter menus for patient monitoring, to adjust the display, and to setup and use special views.

NOTE: Before using your Datex AS/3 Anesthesia Monitor, please read this Operator's Manual thoroughly. Pay special attention to WARNING and CAUTION statements appearing throughout the manual.

Additional Information

Operator's Manual

The basic operations of the AS/3 Anesthesia Monitor are described in the AS/3 Anesthesia Monitor Operator's Manual.

Anesthesia Information Management products are described in the AS/3 Anesthesia Information Centre Operator's Manual and AS/3 Anesthesia Record Keeper Operator's Manual.

Installation

There is a separate AS/3 Installation Manual covering the following subjects:

1 Introduction
2 AS/3 Anesthesia Monitor Installation
3 Secondary Display Installation
4 AS/3 Airway Module Installation
5 AS/3 Extension Frame Installation
6 AS/3 Record Keeper Installation
7 Functional Examination
8 Configuration
9 Interfacing
10 Connectors
11 Appendices

Service

A separate service manual describes service, maintenance and reparation procedures of the AS/3 Anesthesia Monitor. Service and reparations are allowed by authorized service personnel only.

Cleaning and daily maintenance are described in chapter 9.

Clinical Application

Information on clinical application can be found in the following Datex publications:

- Interpreting the Plethysmographic Pulse Wave, Appliguide
- Side Stream Spirometry, Appliguide
- Patient Oxygen, Appliguide
- First steps in CO2 monitoring, Appliguide
- Cardiac Output, Quick Guide
- PCWP, Quick Guide
- ST segment analysis, Quick Guide
- Side Stream Spirometry, Quick Guide

The accessories are described in the AS/3 Anesthesia Monitor Supplies and Accessories catalog.

Abbreviations and Symbols

Abbreviations

Anaesthetic agents:

AA	anaesthetic agent
Des	Desflurane
Enf	Enflurane
Hal	Halothane
Iso	Isoflurane
Sev	Sevoflurane

Airway gas measurements:

APN	Apnea
CO_2	Carbon dioxide
ET, Et	end tidal concentration
FI, Fi	concentration of inspired gas
MAC	minimum alveolar concentration
N_2O	Nitrous Oxide
O_2	Oxygen

Airway pressure and flow:

Compl	compliance
MV	minute volume
Paw	airway pressure
PEEP	positive end expiratory pressure
Ppeak	peak pressure
Pplat	plateau (pause) pressure
SSS	Side Stream Spirometry
TV	tidal volume

Blood pressure:

Art	arterial
ABP	arterial blood pressure
BP	blood pressure
CVP	central venous pressure
Dia	diastolic pressure
Inv.	Invasive
LAP	left atrial pressure
Mean	mean of diastolic and systolic pressures
NIBP	non-invasive blood pressure

Px	standard pressure label, x being 1, 2, 3 or 4
PA	pulmonary arterial pressure
PCWP	pulmonary capillary wedge pressure
RAP	right atrial pressure
RVP	right ventrical pressure
Sys	systolic pressure

Hemodynamic calculations:

BSA	body surface area
C.I.	cardiac index
C.O.	cardiac output
LVSW	left ventricular stroke work
LVSWI	left ventricular stroke work index
PVR	pulmonary vascular resistance
PVRI	pulmonary vascular resistance index
RVSW	right ventricular stroke work
RVSWI	right ventricular stroke work index
SI	stroke volume index
ST	ST segment of ECG
SV	stroke volume
SVR	systemic vascular resistance
SVRI	systemic vascular resistance index

Oxygenation calculations

FiO_2	fraction of inspired oxygen
$PaCO_2$	arterial carbon dioxide level
PaO_2	arterial oxygen level
SaO_2	arterial oxygen saturation
CaO_2	arterial oxygen content
PvO_2	venous oxygen level
SvO_2	venous oxygen saturation
CvO_2	venous oxygen content difference
Hgb	hemoglobin
ATMP	atmospheric pressure
$C(a\text{-}v)O_2$	arteriovenous oxygen content difference
O_2ER	oxygen extraction ratio
DO_2	oxygen transport
DO_2I	oxygen transport index
VO_2	oxygen consumption
VO_2I	oxygen consumption index
PAO_2	alveolar oxygen level
$AaDO_2$	alveolo-arterial oxygen difference
Qs/Qt	venous admixture

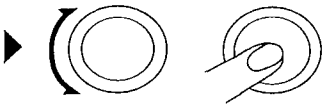
Temperature:

Tx	temperature label, x being 1 or 2, or one of the following list
AirW	airway temperature
Axil	axillary temperature
Blad	bladder temperature
Blood	blood temperature (only in C.O. measurement)
Eso	esophageal temperature
Myo	myocardial temperature
Naso	Nasopharyngeal temperature
Rect	rectal temperature
Room	room temperature
Skin	skin temperature
Temp	temperature
Tymp	tympanic temperature

Miscellaneous:

Contrl	controlled ventilation
ECG	Electrocardiography
HR	heart rate
IABP	intra-aortic balloon pump
LED	light emitting diode
LCD	liquid chrystal display
Pleth	plethysmograph waveform
Resp	respiration rate
SpO2	oxygen saturation measured by pulse oximeter
Spont	spontaneous breathing

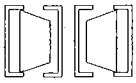
Symbols



Indicates the procedure for making adjustments (rotate and push) in the menus. See chapter How to Use Menus for more information.

Sub menu. Choosing an alternative with this symbol in a menu opens a new menu.

The monitor is connected to the Datex AS/3 Anesthesia Network.



Indicates that the Data card (green) and/or the Menu card (white) is inserted

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1 SAFETY

Intended Purpose

The AS/3 Anesthesia Monitor is intended for monitoring hemodynamic, respiratory and ventilatory parameters of anesthetized patients.

This system is intended for use by qualified medical personnel only.

Equipment Classification

Classification according to IEC 601-1

* CLASS I EQUIPMENT according to the type of protection against electrical shock.
* TYPE BF or CF equipment according to the degree of protection against electric shock is indicated by a symbol on each parameter module.
* ORDINARY EQUIPMENT according to the degree of protection against the harmful ingress of water.
* EQUIPMENT not suitable for use in the presence of a FLAMMABLE ANESTHETIC MIXTURE WITH AIR or WITH OXYGEN OR NITROUS OXIDE.
* CONTINUOUS OPERATION according to the mode of operation.

Responsibility of the Manufacturer

Datex Division, Instrumentarium Corp. is responsible for the effects on safety, reliability and performance of the equipment only if:

- assembly, operations, extensions, readjustments, modifications or repairs are carried out by personnel authorized by Datex.
- the electrical installation of the relevant room complies with appropriate requirements.
- the equipment is used in accordance with this Operator's Manual.

Safety Precautions

A **WARNING** INDICATES A SITUATION IN WHICH THE USER OR THE PATIENT MAY BE IN DANGER OF INJURY OR DEATH.

EXPLOSION HAZARD

* Do not use the Datex AS/3 Anesthesia Monitor in presence of flammable anesthetics.

ELECTRICAL SHOCK HAZARD

* Use only hospital grade grounded electrical outlets and power cord.

* Make sure that external equipment is hospital grade grounded before connecting to Datex equipment.

* Disconnect the Central Unit from electrical outlet before cleaning. Let it dry completely before reconnecting it to the electrical outlet.

* Do not autoclave any part of the monitor with steam or ethylene oxide. Do not immerse in liquid or allow liquid to enter the interior of any part.

* Do not connect any other external equipment to the system than those specified by Datex.

* The Video Display line cord is to be connected only to the power outlet of the Central Unit. Connecting it to the mains power will cause the video display leakage current to exceed the limit specified for medical equipment.

* Make sure that the additional display is properly grounded and isolated before you connect it to the Datex AS/3 Anesthesia Monitor.

* Before starting to use the system, ensure that the whole combination complies with the international standard IEC 601-1-1 and with the requirements of the local authorities.

PATIENT SAFETY

* This device is to be used by or on the order of a physician.

* Constant attention by a qualified professional is needed whenever a patient is under anesthesia or connected to a ventilator. Some equipment malfunctions may pass unnoticed in spite of the monitor alarm.

* Always make sure that alarm limits are set and alarms are active when monitoring a patient.

* PACEMAKER PATIENTS: Rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely entirely upon rate meter alarms. Keep pacemaker patients under close surveillance.

* Ensure proper contact of the return electrode of the electrosurgery unit to your patient to avoid possible burns at ECG electrode or other probe sites.

* Use only patient cables and accessories specified in the AS/3 Supplies and Accessories catalogue and accessories approved by Datex. Other cables and accessories may damage the system or interfere with measurement. Single-use accessories are not designed to be reused.

* All invasive procedures involve patient risks. Use aseptic technique. Follow catheter manufacturer's instructions.

* Do not perform cardiac output measurement during electrosurgery. Erroneous values may result.

A **CAUTION** INDICATES A SITUATION IN WHICH THE UNIT OR DEVICES CONNECTED TO IT MAY BE DAMAGED.

* Use only patient cables and accessories approved by Datex. Other cables and accessories may damage the system or interfere with measurement.

* Before connecting power cord to power outlet, check local voltage and frequency stated on the device plate on the rear panel of the Central Unit.

* Turn power off before making any rear panel connections.

* Use only specified Datex AS/3 Anesthesia Monitor interface cables.

* Do not store the monitor outside the specified temperature range (-10 to + 50°C / 14 to 122 °F).

* Avoid ammonia-, phenol- or acetone-based cleaners. They may damage the monitor.

* Clean rear panel fan dust filters once a month or whenever needed.

* Leave space for ventilation to prevent the monitor from overheating.

* Discard the device and parts thereof according to local regulations. Do not discard in the nature.

Equipment Safety Symbols

Attention, consult accompanying documents.

When this symbol is displayed beside the O_2 value FiO_2 low alarm limit is set below 21 %.

Symbol on the rear panel of the central unit means the following warnings and cautions:

> Electric shock hazard. Do not open the cover or the back. Refer servicing to qualified personnel.
>
> For continued protection against fire hazard, replace only with same type and rating of fuse.
>
> Disconnect power supply before servicing.

Type BF (IEC-601-1) protection against electrical shock.

Type BF (IEC-601-1) defibrillator-proof protection against electrical shock.

Type CF (IEC-601-1) protection against electrical shock.

Type CF (IEC-601-1) defibrillator-proof protection against electrical shock.

Silence alarm indicator

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2 SYSTEM DESCRIPTION

Principles of Functions

The AS/3 Anesthesia Monitor is a modular multiparameter patient monitor. The AS/3 Anesthesia Monitor is especially designed for anesthesia monitoring.

The modular design makes for a flexible system with easy upgradeability. In addition to parameter upgrades the modularity includes an easy upgrade to anesthesia record keeping, monitor networking and interfacing with other external devices.

Main Components

Datex AS/3 Anesthesia Monitor consists of elements shown below:

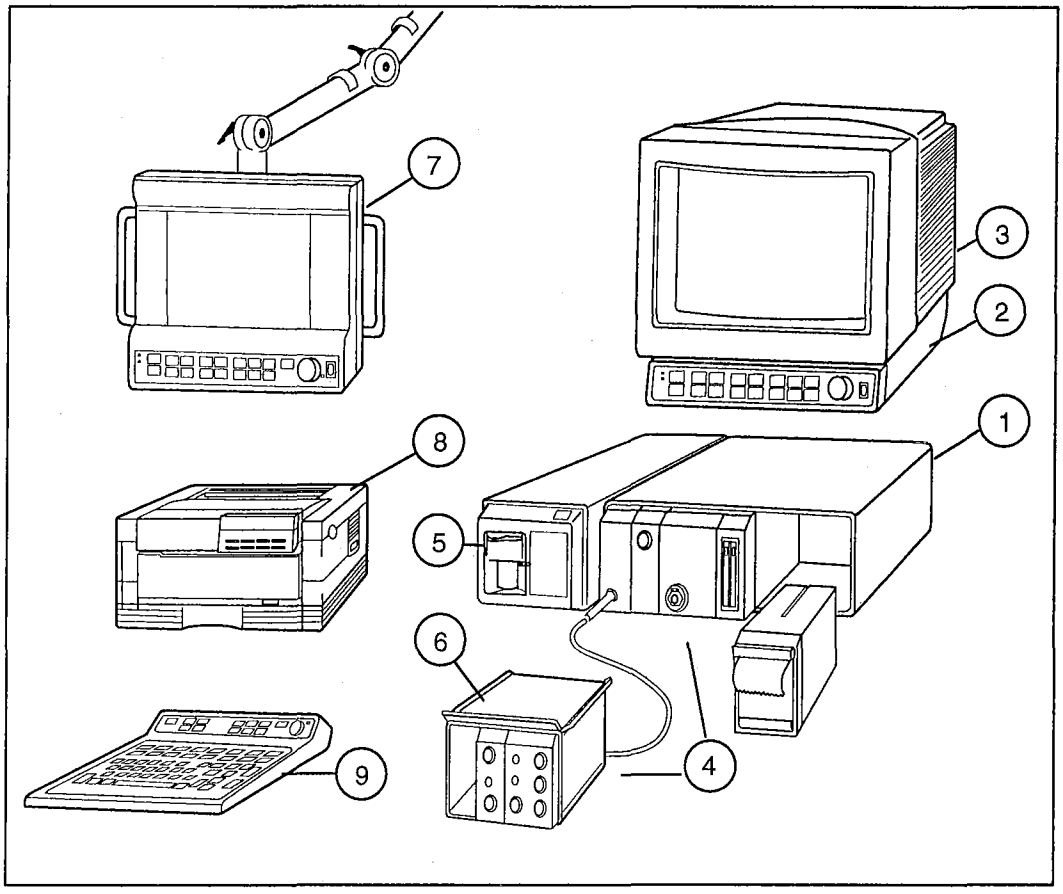

Figure 2-1 Datex AS/3 Anesthesia Monitor

1) Central Unit, R-CU3
2) Command Board, K-VHC14
3) Main Display, D-VHC14
4) Parameter Modules
5) Airway Module
6) Extension Frame, F-EXT4
7) LCD Display, D-LCC10
8) Laser printer, HP LaserJet 4 p
9) Anesthesia Keyboard, K-ARK

Main Displays

There are two options for Main Display: a 14" color video display or a 10" color LCD display.

The display is used to show up to six waveforms, real-time data and trends. The Command Board, K-VHC14, is used to make adjustments in the display and monitored parameters, silence the alarms, and reset the defaults.

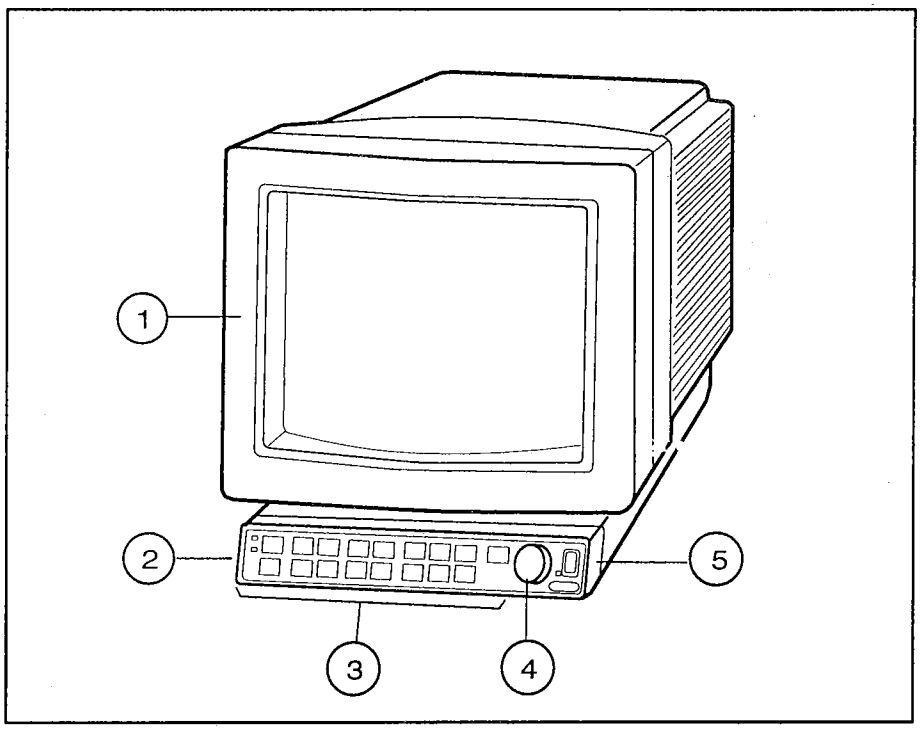

Figure 2-2 Video Display

(1) Video Display, D-VHC14
(2) Command Board, K-VHC14
(3) Command Board keys
(4) ComWheel
(5) Standby STBY/ON switch

LCD Display

With LCD Display, D-LCC10, the desired information and Command Board can be brought conveniently near to the patient.

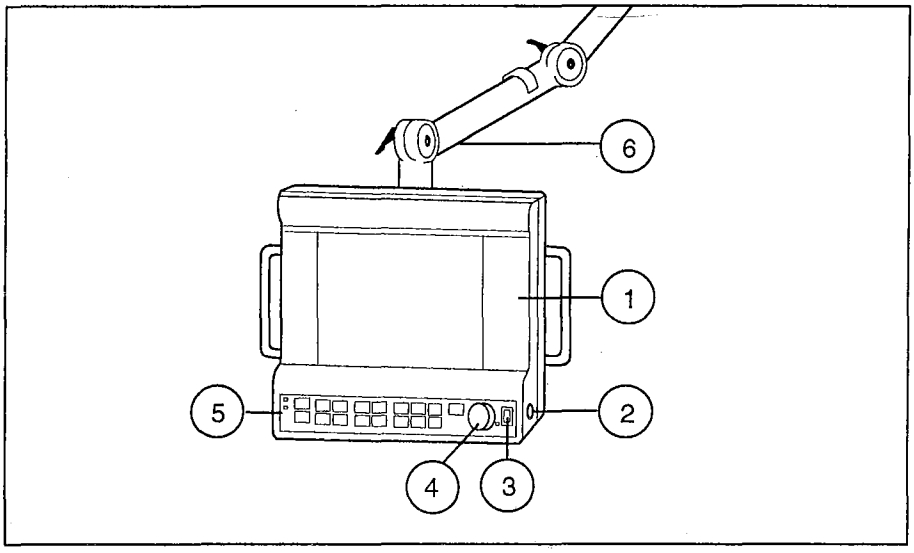

Figure 2-3 LCD Display

(1) LCD screen
(2) Connector for Datex AS/3 Anesthesia Keyboard, K-ARK
(3) On/Standby switch (ON/STBY)
(4) ComWheel
(5) Command Board keys
(6) Display Arm

To use the LCD Display a Display Controller, B-DVGA, is needed and the display can be used with VGA resolution only.

CAUTION: The LCD Display is fragile. Be careful not to hit the LCD Display against anything when moving it.

Cleaning LCD Display

* Wipe all splashes immediately with a dry cloth.
* Wipe the LCD Display after use with a cloth moisturized with mild detergent solution.

Central Unit

The Central Unit houses the modules used with the monitor. It accepts patient data from the modules and formats it for the display. Using the connector in the rear, data and waveforms are sent to the display or accepted from other peripherals. There are eight slots for the modules in the Central Unit.

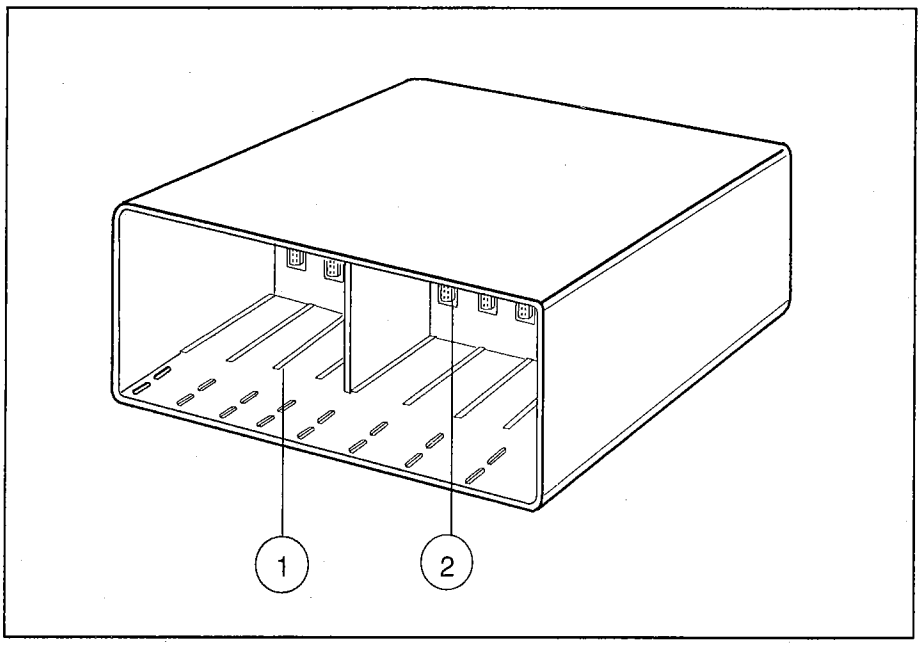

Figure 2-4 Central Unit

(1) Insertion guide
(2) Module connector

Rear of Central Unit

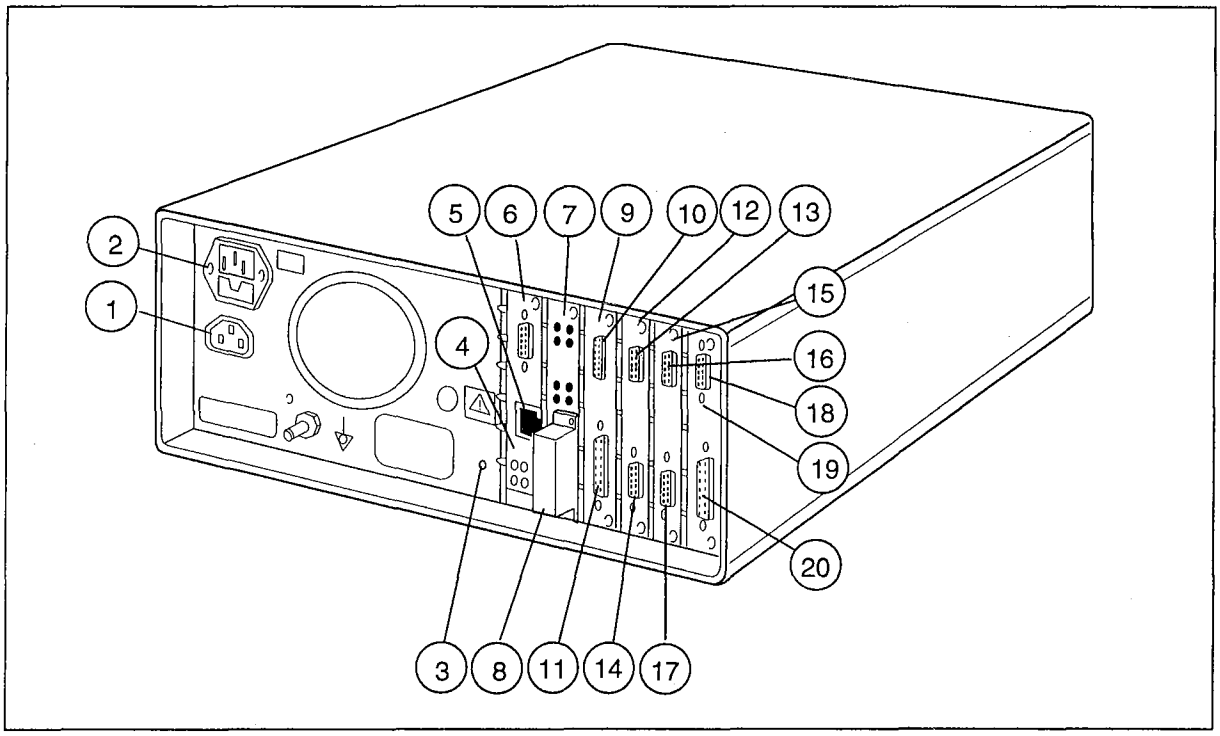

Figure 2-5 Rear of Central Unit

(1) Power outlet for Video Display Unit (CRT)
(2) Receptacle for power cord and fuses
(3) Service reset button
(4) Network Board, B-NET
(5) Network connector
(6) Identification plug connector
(7) CPU Board, B-CPU2
(8) Software Cartridge, S-STD/S-ARK
(9) UPI board
(10) Serial communication connector
(11) Analog and digital input/output connector
(12) High Resolution Display controller, B-DHIGH or VGA Display Controller, B-VGA (Video 1)
(13) Command Board connector and combined LCD display connector
(14) Display connector (CRT)
(15) High Resolution Display controller, B-DHIGH or VGA Display Controller, B-VGA (Video 2)
(16) Command Board connector and combined LCD display connector
(17) Display connector (CRT)
(18) Serial communication connector
(19) Interface Board, B-INT or Gas Interface Board, B-GAS
(20) Module bus connector (Airway Module Gas interface cable)

Your Central Unit may not have all these boards.

Overview of Modules

Table 2-1 Available Modules and Parameters

Parameter	Double width M-ESTP	M-ETP	M-EST	M-NIBP	M-P	M-PT	M-COP
ECG	3 channel	3 channel	3 channel				
Inv. pressure	2	2			1	1	1
SpO2	*		*				
Temperature	2	2	2			2	
NIBP				*			
Cardiac output							*

Parameter	G-AO	G-AiO	G-AOV	G-AiOV	G-O	G-OV
CO2	*	*	*	*		*
N2O	*	*	*	*		
O2	*	*	*	*		*
Anaesthetic agents	*	*	*	*		
Agent identification		*		*		
Side Stream Spirometry			*	*		*

Also: Recorder Module, M-REC and Memory Module, M-MEM

CAUTION: Do not connect or disconnect the Airway Module during operation.

NOTE: Connect only one patient to one Datex AS/3 Anesthesia Monitor at a time.

NOTE: Do not use identical modules in the same monitor simultaneously.

General Module Description

The hemodynamic modules are plugged into the Central Unit. They can be removed or inserted during operation. All the plug-in modules have some common parts, which are shown below:

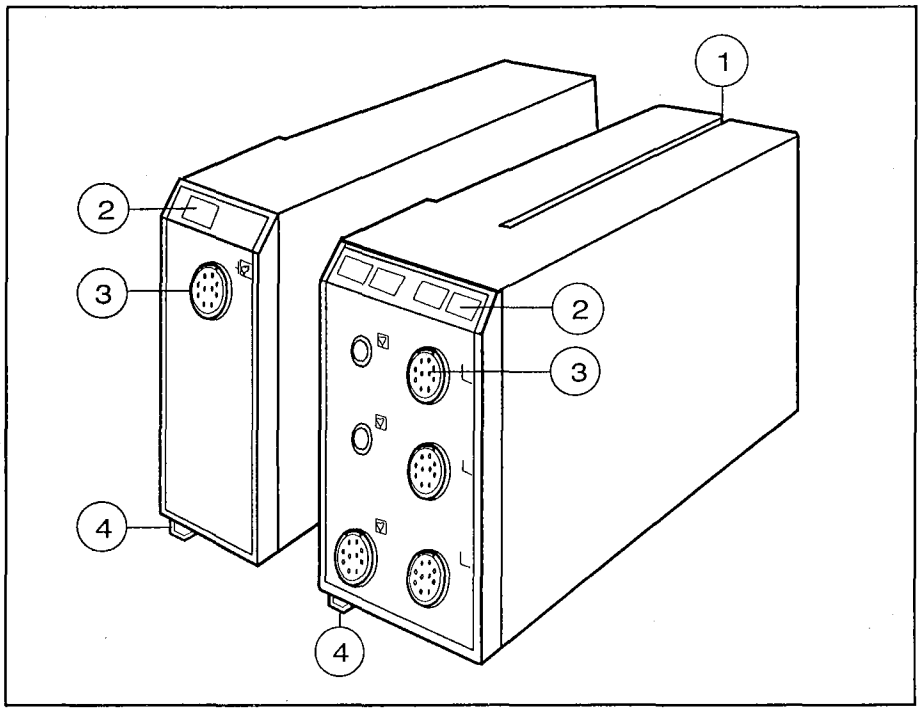

Figure 2-6 General Module

(1) Insertion Guide Slot
(2) Module keys
(3) Patient cable connectors
(4) Module release latch

Inserting Module

Insert the Guide Slot onto the guide in the Central Unit. Push the module until you will hear a click.

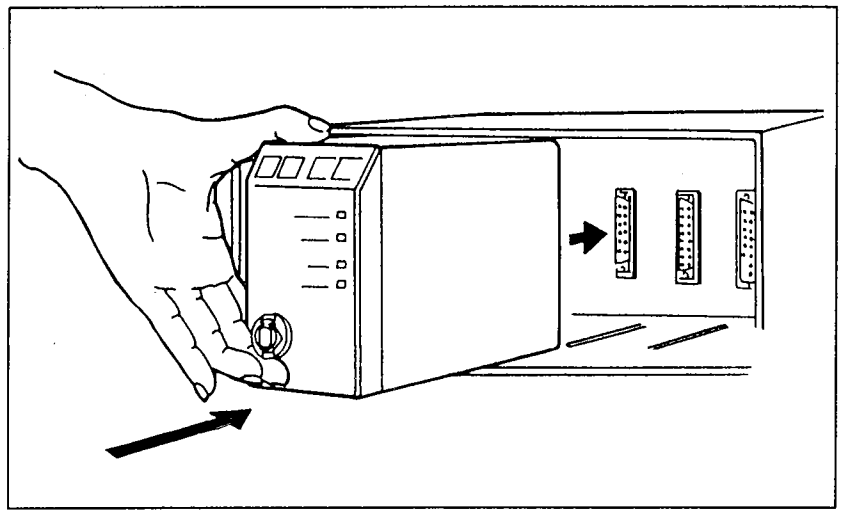

Figure 2-7 Inserting Module

Removing Module

Push up the release latch on the bottom, left hand side of the module. Then, pull the module out of the Central Unit.

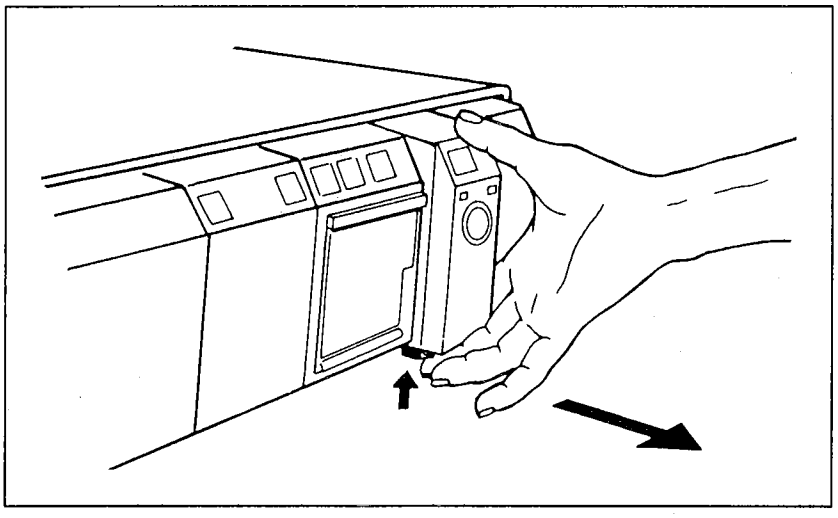

Figure 2-8 Removing Module

Airway Modules

The Airway Module can be attached to the side of the Central Unit or located separately.

Use a AS/3 Airway Module Mounting Plate for attaching the Airway Module to the CentralUnit. For more instructions see the AS/3 Anesthesia Monitor Installation Manual.

There are 6 Airway Modules available: G-AO with manual agent selection or G-AiO with agent identification, G-AOV and G-AiOV respectively with Side Stream Spirometry measurement. G-O with CO_2 and O_2 when no anesthetic agent measurement is required and G-OV with additional Side Stream Spirometry measurement.

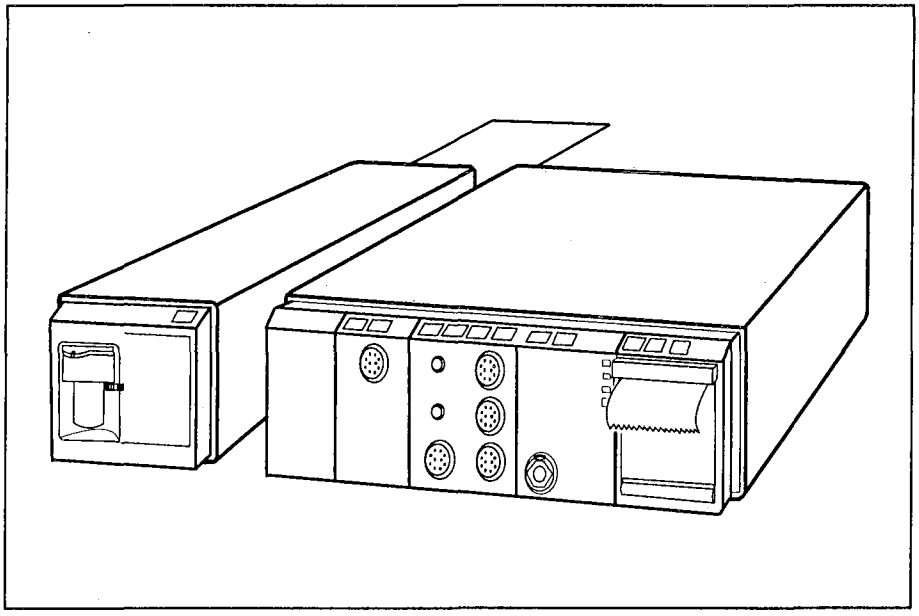

Figure 2-9 Side-Mounting of Airway Module

Optional Products

Extension Frame

The Extension Frame, F-EXT4, provides four additional module places and flexibility for monitor setup. The Frame can be placed beside the Central Unit or taken closer to the patient, e.g. attached to the IV pole.

The Extension Frame links information of several patient cables into the Central Unit by a single cable.

The Extension Frame can be used as an invasive pressure 'station'. The Frame can be attached to the IV pole and equipped with invasive pressure measuring modules. The zeroing is easy when the dome stopcock and zeroing keys are near to each other.

The modules are used in the same way as in the Central Unit, e.g. the module keys function directly.

NOTE: Use only one Extension Frame in one Central Unit.

NOTE: Do not use identical modules in the Central Unit and Extension Frame simultaneously.

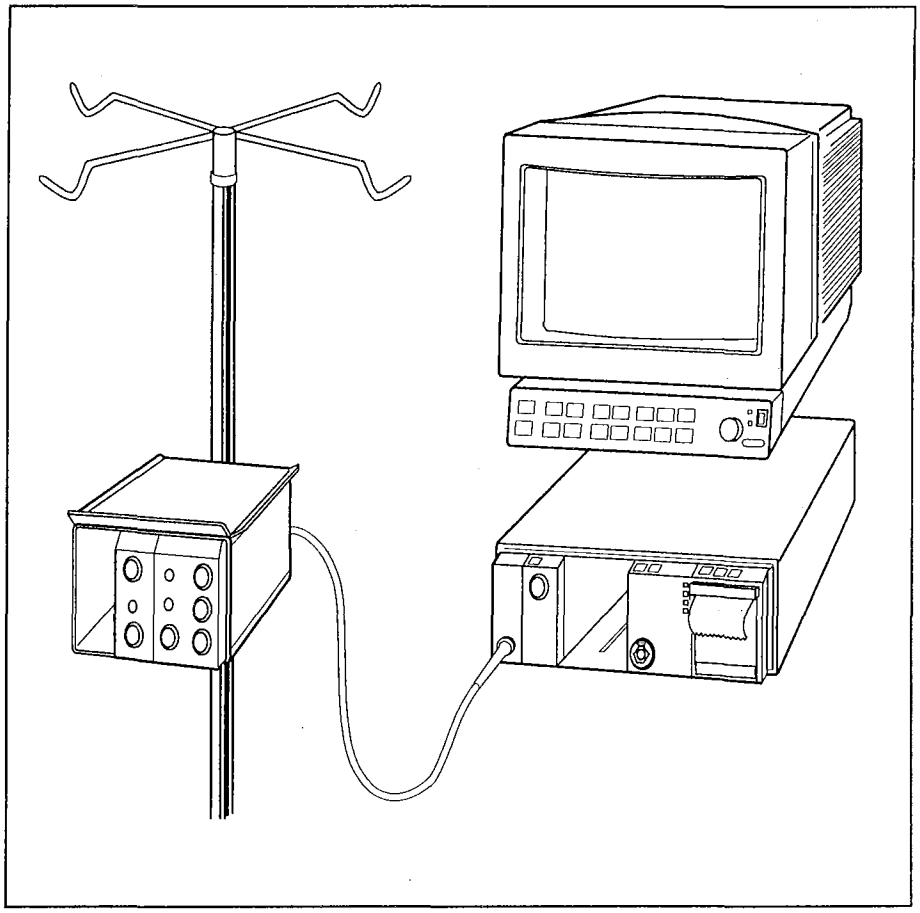

Figure 2-10 Extension Frame with Extension Mount Accessory

NOTE: Recorder Module, M-REC, cannot be used in the Extension Frame.

The Extension Frame is connected to the Central Unit by an Extension Module, M-EXT. The monitor end of the cable is plugged as any module into the Central Unit.

For installation instructions see Installation Manual.

21" Display

The large high resolution 21" Display Monitor Unit, D-VSC21, can be used as a secondary display, e.g. to bring the monitored information near to the surgeon.

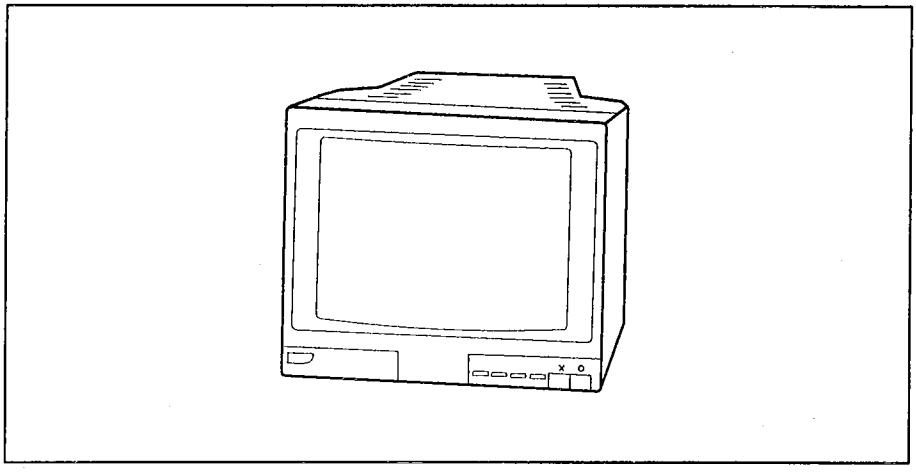

Figure 2-11 21" Display Monitor Unit, D-VSC21

WARNING: ELECTRICAL SHOCK HAZARD: The secondary display must always be supplied from an appropriate extra isolating transformer. Without an appropriate transformer the leakage current of the secondary display can be too high.

WARNING: ELECTRICAL SHOCK HAZARD: Before starting to use the system, ensure that the whole combination complies with the international standard IEC 601-1-1 and with the requirements of the local authorities.

For further information see the Video Display's manual.

Record Keeper

With the AS/3 Anesthesia Record Keeper you can:

- automatically record the patient vital signs during anesthesia
- include also the drug information, the important events and your comments into the electronic anesthesia record
- print legible anesthesia records

In addition the collected information can be transferred electronically for statistical surveys, billing etc. Also the archiving and retrieval of patient anesthesia records becomes faster and more reliable.

The record keeper cable is attached to the rear panel of the central unit or it may be attached to the LCD Display.

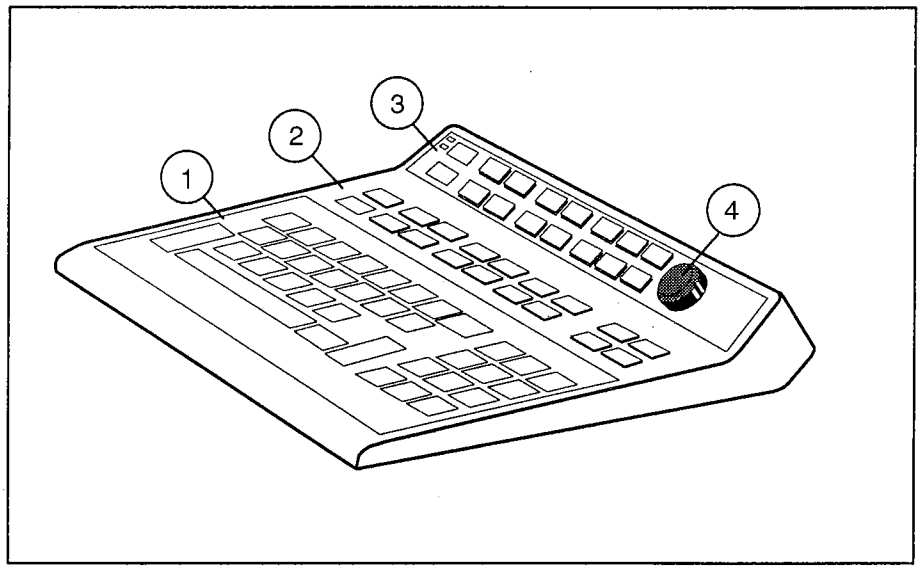

Figure 2-12 Record Keeper Keyboard

1) Letters and numbers keys (alphanumeric keys)
2) Record Keeper function keys
3) AS/3 Command Board
4) ComWheel

Interfacing

Separate monitors can be connected to the AS/3 Anesthesia Monitor, and the information measured by them can be seen on the AS/3 Anesthesia Monitor's Display.

The selections of the gas, SpO2 and NIBP interface lists are:

CC/CG	Cardiocap
AGM	Capnomac
CNO-103	Multicap
CD-200	Normocap 200
CD2-O2	Normocap 200 Oxy
SC/SCO	Oscar/Oscar Oxy
ULT	Capnomac Ultima
ULT/al	Capnomac Ultima with alarm integration
OS-123	Satlite
OSE-123	Satlite Plus
OSP-200	Satlite Trans
N-100	Nellcor N-100 or N-1000
N-200	Nellcor N-200
1846SX	Critikon Dinamap, model SX
Oxim. 3	Abbot Oximetrix 3

NOTE: When N-1000 is interfaced only the SpO_2 information is transmitted.

NOTE: To use other than Datex monitors, the Interface Board, B-INT, is needed.

NOTE: The automatic HR SOURCE detection may cause erroneous results when an external monitor is used.

WARNING: ELECTRICAL SHOCK HAZARD: Before starting to use the system, ensure that the whole combination complies with the international standard IEC 601-1-1 and with the requirements of the local authorities.

See Installation Manual for further information of installing and cabling of different monitors.

The amount of transmitted information depends on the external monitor chosen, see the table:

Table 2-2 Interface to External Monitors

Waveforms	**ULT/ al**	**ULT**	**AGM**	**SC/ SCO**	**CD-200/ CD2-O2**	**CC/ CG**	**OS/ OSE**	**OSP**	**N-100**	**N-200**	**1846SX**	**Oxim. 3**
CO2	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	-
O2	No	No	No	No	No	No	-	-	-	-	-	-
AA	No	No	No	-	-	No	-	-	-	-	-	-
Spirometry	No	No	-	-	-	-	-	-	-	-	-	-
Spirometry loops	No	No	-	-	-	-	-	-	-	-	-	-
Plethysmogram	Yes	Yes	-	Yes	-	No	Yes	No	Yes	Yes	-	-
Numeric values	**ULT/ al**	**ULT**	**AGM**	**SC/ SCO**	**CD-200/ CD2-O2**	**CC/ CG**	**OS/ OSE**	**OSP**	**N-100**	**N-200**	**1846SX**	**Oxim. 3**
Et&Fi Airway gases	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	-
Resp rate	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	-
Spirometry	Yes	Yes	-	-	-	-	-	-	-	-	-	-
SpO2	Yes	Yes	-	Yes	-	Yes	Yes	Yes	Yes	Yes	-	-
SvO2	-	-	-	-	-	-	-	-	-	-	-	Yes
Pulse rate (HR)	Yes	Yes	-	Yes	-	Yes	Yes	Yes	Yes	Yes	-	-
Pleth amplitude	Yes	Yes	-	Yes	-	No	Yes	Yes	No	No	-	-
NIBP S/D/M	-	-	-	-	-	No	-	-	-	-	Yes	-
Alarms/Messages	**ULT/ al**	**ULT**	**AGM**	**SC/ SCO**	**CD-200/ CD2-O2**	**CC/ CG**	**OS/ OSE**	**OSP**	**N-100**	**N-200**	**1846SX**	**Oxim. 3**
CO2, O2, AA High/Low	Yes	No	No	No	No	No	-	-	-	-	-	-
Resp rate High/Low	Yes	No	No	No	No	No	-	-	-	-	-	-
Apnea	Yes	No	No	No	No	No	-	-	-	-	-	-
Occlusion etc.	Yes	No	No	No	No	No	-	-	-	-	-	-
Spirometry alarms	Yes	No	-	-	-	-	-	-	-	-	-	-
SpO2 High/low	Yes	No	-	No	-	No	No	No	No	No	-	-
SvO2 High/low	-	-	-	-	-	-	-	-	-	-	-	Yes
Pulse rate High/Low	Yes	No	-	No	-	No	No	No	No	No	-	-
No probe/ Probe off	Yes	Yes	-	Yes	-	Yes	Yes	Yes	Yes	Yes	-	-
Pulse search	Yes	Yes	-	Yes	-	Yes	Yes	Yes	No	Yes	-	-
NIBP High/Low	-	-	-	-	-	No	-	-	-	-	Yes	-
Cycle time	-	-	-	-	-	No	-	-	-	-	No	-
NIBP messages	-	-	-	-	-	No	-	-	-	-	No	-

Equipment Symbols

Attention, consult accompanying documents.

Symbol on the rear panel means following warnings and cautions:

Electric shock hazard. Do not open cover or back. Refer servicing to qualified personnel.

For continued protection against fire hazard, replace only with same type and rating of fuse.

Disconnect power supply before servicing.

Equipotentiality

Alternating current

Fuse

Connector for color display.

Display power supply output.

Specifications

Datex AS/3™ Central Unit
Datex AS/3™ Displays

Central Unit and Display
Central Unit: 8-slot frame for plug-in parameter modules
Display: shows up to six waveforms, integrates monitor controls

Features
- Central Unit and Display physically separate components
- Two Display options with integrated monitor controls:
  High resolution color video display
  Flat panel color LCD display
- User configurable display layout and colors
- Anesthesia dedicated alarm system
- Central alarms display and adjustment page
- 10-minute graphical mini trends referenced to set alarm limits
- Automatic alarm limits function
- Special cardiac bypass mode
- 24 hour numerical trends of all parameters
- Trend cursor in both graphical and numerical trends
- Help function
- On-line help for menu functions
- Open software and hardware architecture
- Support for independently configurable secondary display
- 6 user configurable graphical trends pages
- Easy insertion/removal of plug-in parameter modules without interrupting other monitoring

Technical specifications
Display option: 14" color video display
Display size: 14" diagonal
Display type: low radiation color video CRT
Display resolution: high resolution, 1984 x 512
Number of traces: up to 6
Display layout and colors: user-configurable
Display base with Command Board and direct function keys, menu keys and ComWheel™ for selections and adjustments in menus.

Display option: 10" color LCD display
Display size: 10.4" diagonal
Display type: active matrix color LCD
Display resolution: VGA resolution, 640x480
Number of traces: up to 6
Display layout and colors: user-configurable
Command Board with direct function keys, menu keys and ComWheel™ for selections and adjustments in menus.

Central Unit
Module capacity: 8 module slots
I/O connections: RS-232 computer serial output
digital & analog I/O ports
8 freely configurable analog outputs
Interface capabilities: Datex gas monitors
Datex pulse oximeters
Laser printing capability with LaserJet 4P or other PCL5 compatible laser printers
Expansion slots for additional boards to:
- Connect secondary display
- Interface Datex gas monitors and pulse oximeters, NELLCOR® N-100 and N-200, Critikon Dinamap™ 1846SX, Abbott OXIMETRIX 3® SO_2/C.O.
- Connect Datex AS/3™ Anesthesia Record Keeper
- Connect Datex AS/3™ Anesthesia Network

Dimensions and weight
Central Unit (WxDxH): 315x410x135 mm/12.4x16.1x5.3"
Depth with modules: 412 mm/16.3"
Weight (without modules): 9.5 kg/21 lbs
14" Video Display
(WxDxH): 358x430x330 mm/14.1x17.0x13.0"
Weight: 16.5 kg/37 lbs
10" LCD Display
(WxDxH): 315x74x265 mm/12.4x2.9x10.5"
Weight: 2.9 kg/6.4 lbs

Power supply
Rated voltages and frequencies: 100 V 50/60 Hz
110-120 V 50/60 Hz
220-240 V 50/60 Hz
Allowed voltage fluctuations: 100 V ±10 %
110 V -10 %...120 V +10 %
220 V -10 %...240 V +10 %
Maximum power consumption: 280 VA
Safety class: Class I
Grounding: Hospital grade

Environmental conditions
Operating temperature: +10...+35°C (50...95°F)
Storage temperature: -10...+50°C (14...122°F)
Relative humidity: 0...90 % noncondensing
(in airway 0...100 % condensing)
Atmospheric pressure: 660...1060 mbar (500...800 mmHg)

Trends
- Graphical trends: all parameters, selectable times: 2, 4, 12 or 24 h
- Numerical trends: all parameters, sampled every 5 min, after NIBP, PCWP and C.O. measurement and with Mark Event key
- Trend cursor in both graphical and numerical trends
- Configurable graphical trend pages

Alarms
- Anesthesia alarm system: classified into three categories according to priority in anesthesia; color and audio tone coded
- Central alarms display and adjustment page
- 10-minute graphical mini trends referenced to set alarm limits
- Automatic alarm limits function: alarm limits automatically calculated from current parameter reading when selected
- Alarms history page

Safety standards (apply also to parameter modules)
IEC 601-1 approved, CSA C22.2. No. 125 approved, Meets UL544 specifications

Datex AS/3™ Pressure Module, M-P
Datex AS/3™ Pressure Temp Module, M-PT
Datex AS/3™ Cardiac Output Module, M-COP

Pressure Module, M-P
Single-width plug-in parameter module including one invasive blood pressure channel.

Pressure Temp Module, M-PT
Single-width plug-in parameter module including two additional temperature measurements (T3, T4), one invasive blood pressure channel (P3) and ECG and invBP signal outputs (Signal out) for external devices. Mutually exclusive with Pressure module, M-P.

Cardiac Output Module, M-COP
Single-width plug-in parameter module including thermo-dilution cardiac output measurement and one invasive blood pressure channel.

Invasive blood pressure features
- Direct key for easy pressure channel zeroing
- Selectable labels for invasive blood pressure channels
- Automatic arterial blood sampling detection to eliminate unwanted alarms
- Adjustable pressure scales with 10 mmHg steps
- Overlapping invasive blood pressure waveforms mode
- Special PCWP measurement display view
- Respiration artefact rejection
- Adjustable invasive blood pressure filters
- Easy insertion/removal of module without interrupting other monitoring

Cardiac output features
- Direct keys on the module to start C.O. measurement and zero invasive pressure channel
- Special C.O. measurement display view
- Displays thermodilution curve
- Single and automatic set C.O. measurement modes
- Editing of up to 6 measurements for averaging
- Uses Baxter-Edwards compatible catheters
- Self-test plug for catheter connecting cable and module hardware
- Special haemodynamic and oxygenation calculation display view
- Haemodynamic calculations: CI, SV, SVI, SVR, SVRI, PVRI, LVSW, LVSWI, RVSW, RVSWI
- Oxygenation calculations: FiO_2, $PaCO_2$, PaO_2, SaO_2, PvO_2, SvO_2, Hgb, ATMP, CaO_2, CvO_2, $C(a\text{-}v)O_2$, O_2ER, DO_2, VO_2, DO_2I, VO_2I, PAO_2, $AaDO_2$, Qs/Qt
- Editing of calculation input data
- Trending of calculations
- Printing of calculations to AS/3™ Recorder Module, M-REC
- Easy insertion/removal of module without interrupting other monitoring

Direct function key, M-P
Zero P3: zeroes invasive blood pressure P3

Direct function key, M-PT
Zero P3: zeroes invasive blood pressure P3

Direct function keys, M-COP
Zero P4: zeroes invasive blood pressure P4
Start C.O.: starts C.O. measurement

Dimensions and weight
Module size (WxDxH): 37x180x112mm/1.5x7.1x4.4"
Weight: 0.4 kg/1 lbs

Parameter specifications
Invasive blood pressure
Measurement range: -40...+320 mmHg
Measurement accuracy: ±5 % or ±2 mmHg
Numerical display
Range: -40...320 mmHg
Resolution: 1 mmHg
Averaging: over 5 s, updated every 5 s, or end-expiratory filtering
Alarms: adjustable high and low alarm limits for systolic, diastolic and mean pressures, or off
Waveform display
Range: -30...300 mmHg
Scales: adjustable in 10 mmHg increments
Pulse rate
Measurement range: 30...250 bpm
Resolution: 1 bpm
Accuracy: ±5 % or ± 5 bpm
Transducer sensitivity: 5 µV/V/mmHg, 5 Vdc, max. 20 mA
Pressure filter: 0...22 Hz (-3 dB) adjustable upper limit 4...22 Hz
Arterial blood sampling detection

Cardiac output
Measurement method: thermodilution
Measurement range: 0.1 ...20 l/min
Repeatability: 2% or 0.02 l/min
Numerical display: cardiac output, cardiac index, blood and injectate temperatures
Injectate temperature range: 0...27 °C
Blood temperature range: 17.5...43 °C
Injectate temperature accuracy with Baxter-Edwards temperature probes: ±0.3 °C (0...25.5 °C) ±0.5 °C (25.5...27.0 °C)
Blood temperature accuracy with Baxter-Edwards catheters: ±0.5 °C (17.5...31.0 °C) ±0.3 °C (31.0...43.0 °C)
Injectate volume: 3, 5 or 10 ml
Display resolution: 0.01 l/min (C.O.>10 l/min; resolution 0.1 l/min)
Catheters: Baxter-Edwards compatible

Temperature
2 temperature measurement channels
Numeric display: 2 temperatures, differential T4-T3
Temperature units: °C or °F
Measurement range: 10...45 °C (50...113 °F)
Display resolution: 0.1 °C (0.1 °F)
Measurement accuracy: ± 0.2 °C (10...24.9 °C) ± 0.1 °C (25...45.0 °C)
Probe type: YSI 400 series

Signal Output (M-PT only)
ECG1 signal (1V/1mV)
InvBP, P3, signal (1V/100mmHg)

Datex AS/3™ ESTP Module, M-ESTP
Datex AS/3™ ETP Module, M-ETP
Datex AS/3™ EST Module, M-EST

Haemodynamic multiparameter modules

ESTP Module: double-width plug-in parameter module including 3-channel ECG with ST segment analysis, pulse oximetry (SpO_2)/pleth, 2 temperature and 2 invasive blood pressure measurements

ETP Module: double-width plug-in parameter module including 3-channel ECG with ST segment analysis, 2 temperature and 2 invasive blood pressure measurements

EST Module: double-width plug-in parameter module including 3-channel ECG with ST segment analysis, pulse oximetry (SpO2)/pleth, and 2 temperature measurements

Features

- Cost-effective integrated multiparameter module
- Up to 3-channel ECG measurement
- Continuous ST segment analysis of all measured channels
- Special ST segment analysis display view
- Automatic or manual setting of ST measurement points
- Diagnostic, monitoring and ST filters for ECG
- Grid for accurate ECG waveform analysis
- Respiration artefact rejection in ECG and invasive blood pressures
- Special PCWP measurement display view
- Selectable labels for invasive blood pressures
- Overlapping invasive blood pressure waveforms mode
- Adjustable invasive blood pressure filters
- Varying pitch of pulse beep with SpO_2
- Diagnostic plethysmogram
- Adjustable pulse beep volume
- Autotest for temperature measurement channels
- Easy insertion/removal of module without interrupting other monitoring

Direct function keys

ECG Lead: selects lead for ECG1
PCWP Start: starts wedge pressure measurement
Zero P1: zeroes invasive blood pressure P1
Zero P2: zeroes invasive blood pressure P2

Dimensions and weight

Module size (WxDxH): 75x180x112 mm/3.0x7.1x4.4"
Weight: 0.6 kg/2 lbs

Parameter specifications

ECG

Measurement method: 3 or 5 lead ECG
Lead selection: I, II, III, aVL, aVF, aVR, V simultaneous measurement of 3 different ECG leads
Waveform display: monitoring filter 0.5...30 Hz; ST filter 0.05...30 Hz; diagnostic filter 0.05...100 Hz
With 60 Hz power supply frequency: monitoring filter 0.5...40 Hz; ST filter 0.05...40 Hz
Sweep speed: 12.5, 25 or 50 mm/s
Length of trace: 16, 8, or 4 s
Heart rate
- Measurement range: 30...250 bpm
- Measurement accuracy: ±5 % or ±5 bpm
- Display resolution: 1 bpm
- Averaging time: 10 s
- Display update interval: 5 s

Alarms: adjustable high and low alarm limits for heart rate, asystole, leads-off detection
Gain range: 0.2...5.0 mV/cm
Allowable offset: ±300 mVd.c.
Pacemaker pulse detection: detection level: 2...500 mV; pulse duration: 0.5...2 ms

ST segment analysis

Measured and displayed simultaneously of up to three ECG leads
ST level range: -6...+6 mm (-0.6...+0.6 mV)
Display resolution: 0.1 mm (0.01 mV)
Averaging: calculated from 16 QRS complexes
Display update interval: 5 s

Pulse Oximetry (SpO_2)/pleth

Measurement method: red and infrared light absorption

SpO_2
- Measurement range: 40...100 %
- Calibration range: 50...100 %; calibrated against functional oxygen saturation
- Display resolution: 1 digit (1 % of SpO_2)
- Measurement accuracy*(% SpO_2 ±1SD): 100...80 %, ±2 digits; 80...50 %, ±3 digits; 40...50 %, unspecified
- Display averaging time: adjustable 10 s, 20 s or beat-to-beat
- Alarms: adjustable high and low alarm limits for SpO_2, probe off, no probe

Pulse rate
- Measurement range: 30...250 bpm
- Display resolution: 1 digit (1 bpm)
- Measurement accuracy: ±5 % or ±5 bpm
- Alarms: adjustable high and low alarm limits for pulse rate

Plethysmographic pulse waveform
- scales: 2, 5, 10, 20, 50 mod% or automatic scaling

Invasive blood pressure

2 invasive blood pressure measurement channels
Measurement range: -40...320 mmHg
Measurement accuracy: ±5 % or ±2 mmHg
Numeric display
- Range: -40...320 mmHg
- Resolution: 1 mmHg
- Averaging: over 5 s, updated every 5 s, or end-expiratoy filtering
- Alarms: adjustable high and low alarm limits for systolic, diastolic and mean pressures, or off

Waveform display
- Range: -30...300 mmHg
- Scales: adjustable in 10 mmHg increments

Pulse rate
- Measurement range: 30...250 bpm
- Resolution: 1 bpm
- Accuracy: ±5 % or ±5 bpm

Transducer sensitivity: 5 µV/V/mmHg, 5 Vdc, max. 20 mA
Pressure filter: 0...22 Hz (-3 dB), adjustable upper limit 4...22 Hz

Temperature

2 temperature measurement channels
Numerical display: 2 temperatures, differential T2-T1
Temperature units: °C or °F
Measurement range: 15...45°C (50...113°F)
Display resolution: 0.1°C (0.1°F)
Measurement accuracy: ±0.1°C (25...45.0°C); ±0.2°C (10...24.9°C)
Probe type: YSI 400 series

* Accuracy is based on deep hypoxia studies using Datex Finger Sensors on volunteered subjects. Arterial blood samples have been analyzed by a Radiometer OSM Co-oximeter. Refer to Datex SatSensor directions for specific SpO_2 accuracy.

Datex AS/3™ NIBP Module, M-NIBP

Non-invasive blood pressure module
Double-width plug-in parameter module with automated oscillometric non-invasive blood pressure measurement for adults, children and infants.

Features
- Uses oscillometric method to derive pressures
- Direct keys on the module for the most common functions
- Automatic measurement at user-selectable intervals
- Displays systolic, diastolic and mean pressures
- User-adjustable alarms on systolic, diastolic and mean pressure values
- Automatic safety limits based on the cuff hose type used (adult/infant)
- 5 minute continuous STAT mode
- Venous stasis for easy venous cannulation
- Audible and visible 'measurement ready' prompt
- NIBP double check measurement if pressure alarm limit is exceeded
- Visual elapsed time indicator from previous measurement
- NIBP measurement triggers data collection to numerical trends and recorder data dump
- Automatic zeroing to ambient pressure
- Easy insertion/removal of module without interrupting other monitoring

Direct function keys and indicators

Auto On/Off:	starts/cancels automatic cuff inflation at selected intervals
Set Cycle Time:	adjusts NIBP inflation interval
STAT On/Off:	starts/cancels continuous STAT measurement
Start/Cancel:	starts single measurement, or cancels any measurement
Auto LED:	indicates autocycling mode measurement
Manual LED:	indicates manually activated measurement mode
STAT LED:	indicates continuous measurement for 5 min
Measuring LED:	indicates NIBP measurement in progress

Dimensions and weight
Module size (WxDxH): 75x180x112 mm/3.0x7.1x4.4"
Weight: 0.9 kg/2 lbs

Parameter specifications
Measurement principle: oscillometric with linear deflation
Deflation speed: heart rate dependent, 5...13 mmHg/s
Measurement range: adult 25...260 mmHg
child 25...195 mmHg
infant 15...145 mmHg
Pulse rate range accepted: 30...250 bpm
Measurement intervals: manual and selectable intervals 1, 2.5, 3, 5, 10, 15, 30, 60 min or continuous STAT mode
Numerical display: systolic, diastolic and mean arterial pressure
Alarms: adjustable high and low alarm limits for systolic, diastolic, mean or off, cuff loose, cuff occlusion
Typical measurement time:
adults 23 s
infants 20 s

Safety features:	adult	child	inf.
Initial inflation pressure (mmHg):	185	150	120
Max. inflation pressure (mmHg):	280	200	150
Overpressure limit (max. 2 s; mmHg):	320	220	165
Max. inflation time (>15 mmHg, min):	2	2	1

Mechanical safety valve: 330 mmHg

Datex AS/3™ Nellcor Compatible Saturation Module, M-NSAT

Features
- Utilizes patented NELLCOR* pulse oximetry measurement algorithm
- Diagnostic plethysmographic waveform
- Variable pitch pulse beep
- Compatible with NELLCOR* oximetry sensors for adult, pediatric and infant patients

Parameter specifications
Measurement method: red and infrared light absorption

Pulse Oximetry/SpO_2
Range: 40...100%
Accuracy: 40...50 % unspecified
50...69 % ± 3 digits, 70...100 % ± 2 digits

Pulse Rate
Range: 20...250 bpm
Accuracy: ± 3 bpm
Plethysmographic pulse waveform scaling: Automatic
Display average time: 5 - 7 s.
Alarms: adjustable hign and low alarm limits for SpO_2 and pulse rate, loss of pulse and no probe.

Dimensions and weight
Dimensions (WxDxH): 37 x 180 x 112 mm/ 1.5 x 7.1 x 4.4 "
Weight: 0.4 kg/1.4 lbs

Degree of protection
BF

Ordering information
A Nellcor sample sensor assortment pack is delivered with every Datex AS/3™ Nellcor Compatible Saturation Module, M-NSAT.

Only NELLCOR* oximetry sensors can be used with Datex AS/3™ Nellcor Compatible Saturation Module, M-NSAT.

Use the following sensors with Datex AS/3™ Nellcor Compatible Saturation Module:
- D25, D25 L OXISENSOR II adult oxygen transducer
- D20 OXISENSOR II pediatric oxygen transducer
- I20 OXISENSOR II infant oxygen transducer
- N25 OXISENSOR II neonatal/adult oxygen transducer
- R15 OXISENSOR adult nasal oxygen transducer
- A OXICLIC adult oxygen transducer
- P OXICLIC pediatric oxygen transducer
- DS100A DURASENSOR adult oxygen transducer
- D-YS DURA-Y oxygen transducer
- OXI-A/N OXIBAND adult/neonatal oxygen transducer
- OXI-P/I OXIBAND pediatric/infant oxygen transducer.

For technical specifications of sensors please refer to the Nellcor's accessory catalogue.

Datex AS/3™ ESTP and EST Modules, M-ESTP and M-EST, use Datex saturation sensors.

NELLCOR, OXISENSOR, OXIBAND, DURASENSOR, DURA-Y and OXICLIC are registered trademarks of Nellcor Incorporated.

Datex AS/3™ Airway Modules G-AO, G-AiO, G-AOV, G-AiOV, G-O, G-OV

Airway gas parameter modules

G-AO	Airway gases: CO_2, Patient O_2, anaesthetic agents and N_2O
G-AiO	Airway gases, agent identification
G-AOV	Airway gases, Side Stream Spirometry™
G-AiOV	Airway gases, Side Stream Spirometry™ and agent identification
G-O	CO_2 and Patient O_2
G-OV	CO_2 and Patient O_2, Side Stream Spirometry

Features

- All parameters measured at the patient's airway
- Datex paramagnetic O_2 measurement
- Patient oxygen: inspired and end-tidal oxygen values, inspired/end-tidal oxygen difference, oxygen waveform
- Datex infrared technology
- D-fend™ water separation system
- Display of CO_2, O_2 and anaesthetic agent waveforms
- Measures all five agents: Enflurane, Halothane, Isoflurane, Sevoflurane and Desflurane
- Anaesthetic agent identification of Enflurane, Halothane, Isoflurane, Sevoflurane and Desflurane (G-AiO, G-AiOV only)
- Slow waveforms, trace length 5 min
- Minimum Alveolar Concentration (MAC) display
- Side Stream Spirometry™ (G-AOV, G-AiOV, G-OV only)
  - D-lite™ flow sensor and gas sampler
  - Special display view for pressure-volume and flow-volume loops
  - Display of pressure and flow waveforms
  - Ability to store up to six loops
  - Recall saved loops to compare to current loop
  - Continuous display of the loops in the digit field
- Full numerical and graphical trends of gases and Side Stream Spirometry™

Direct function key

Select Agent: selects anaesthetic agent (G-AO, G-AOV only)

Dimensions and weight

Module size (WxDxH): 135x410x135 mm/5.3x16.1x5.3"
Weight: 5.2 kg/12 lbs

Parameter specifications

Carbon Dioxide (CO_2)

Measurement range: 0...10 %, (0...10 kPa), (0...76 mmHg)
Measurement rise time: ≤ 360 ms
Accuracy: ≤ 0.2 vol % (0 ... 8 %) *)
≤ 0.4 vol % (8 ... 10 %) *)
Display update interval: breath-by-breath
Waveform displayed

Oxygen (O_2)

Measurement range: 0...100 %
Measurement rise time: ≤ 480 ms
Accuracy: ≤ 2 vol % *)
Display update interval: breath-by-breath
Inspired-expired difference
Waveform displayed

Nitrous Oxide (N_2O)

Measurement range: 0...100 %
Measurement rise time: ≤ 360 ms
Accuracy: ≤ 2 vol % *)
Display update interval: breath-by-breath

Respiration Rate (RR)

Measurement range: 4...60 breaths/min
Detection criteria: 1 % variation in CO_2
Display update interval: breath-by-breath

Anaesthetic Agent (AA)

Halothane, Isoflurane, Enflurane
Measurement range: 0...5 %
Measurement rise time: ≤ 520 ms
Accuracy: ≤ 0.2 vol %
Sevoflurane
Measurement range: 0...8 %
Measurement rise time: ≤ 520 ms
Accuracy: ≤ 0.2 vol %
Desflurane
Measurement range: 0...18 %
Measurement rise time: ≤ 520 ms
Accuracy: 0...5 % ≤ 0.2 vol % *)
5...10 % ≤ 0.5 vol % *)
10...18 % ≤ 1.0 vol % *)
Display update interval: breath-by-breath
Waveform displayed

Agent Identification (G-AiO, G-AiOV only)

Identification threshold: 0.15 vol % *)
Identification time (depends on the fresh gas flow rate) for pure agents: 30 s *)
Alcohol compensation included in agent concentration calculations
Agent mixture detection
Identification range:
Halothane, Isoflurane, Enflurane: 0.15...5 %
Sevoflurane: 0.15...8 %
Desflurane: 0.15...18 %
Identification of mixtures of two gases steady state:
Lower agent concentration is more than 0.3 vol% *) and 15 % *) of total agent concentration
Alarms: adjustable high and low alarm limits for $EtCO_2$, EtO_2, FiO_2, EtAA, FiAA, CO_2 rebreathing level and respiration rate alarms for apnea, FiO_2 ± 18 %, detection of unselected agent, occlusion, air leak

Side Stream Spirometry™

Ventilatory parameters provided by Side Stream Spirometry™:

Ppeak	Peak airway pressure
Pplat	Plateau pressure = end-inspiratory pressure
PEEP	End-expiratory pressure
TVinsp	Inspiratory tidal volume
TVexp	Expiratory tidal volume
MVinsp	Inspiratory minute volume
MVexp	Expiratory minute volume
V1.0	Volume expired in first second
I:E	Ratio between inspiratory and expiratory times
C	Compliance

Pressure-volume loop (P/V)
Flow-volume loop (V/V)
Airway pressure waveform
Flow waveform

Common specifications for D-lite™ and Pedi-lite™ sensors

Airway Pressure
Measuring range: -20...+80 cmH_2O
Resolution: 1 cmH_2O
Accuracy: ±1.5 cmH_2O
Display units: cmH_2O, mmHg or kPa
Display update interval: breath-by-breath
Alarms
Adjustable alarms Ppeak, MVexp, PEEP
Additional messages for disconnection, obstruction and leak.

Sensor specifications	D-lite™	Pedi-lite™
Dead space of sensor	9.5 ml	2.5 ml
Resistance		
at 30 l/min (adults)	0.5 cmH_2O	
at 10 l/min (ped)		1.0 cmH_2O
Recommended to be used with patients weighing	> 20 kg	3 to 30 kg
Respiration rate	4...30/min	4...50/min
I:E ratio	1:3...1:0.5	1:3...1:0.5
Flow		
Measuring range in both directions:	1.5...100 l/min	0.25...25 l/min
Tidal volume		
Measuring range:	150...2000 ml	15...300 ml
Resolution:	1 ml	1 ml
Accuracy:	±6 % or 30 ml	± 6 % or 4 ml *)
Display update interval: breath-by-breath		
Minute volume		
Measuring range:	2.0...15 l/min	0.5...5 l/min
Resolution:	0.1 l/min	0.1 l/min
Accuracy:	±6 %	±6 % *)
Display update interval: breath-by-breath		

Sampling rate: 200 ml/min ± 20 ml
Warm-up time: 3 min, 30 min for full specifications
Calibration interval: 6 months
Automatic compensation for atmospheric pressure variation (500...800 mmHg), temperature and CO_2-N_2O collision broadening effect

Upgrades

Datex AS/3™ Airway Modules G-AO and G-AiO may be equipped with Side Stream Sprirometry™ (V-option) by installing the Datex AS/3™ Spirometry Upgrade Kit, U-V. Automatic agent identification can be added by installing the Datex AS/3™ Agent Identification Upgrade Kit, U-i.

Datex AS/3™ Recorder Module, M-REC

Thermal recorder module
Double width plug-in parameter module with 3-channel thermal array recorder.

Features
- Direct keys on the module for the most common functions
- Prints up to three user-selectable waveforms
- Selectable paper speed
- Grid for accurate waveform analysis
- Prints numerical and graphical trends
- Full numerical printout annotation when one or two waveforms are printed
- Print length: 30 s or continuous
- Print start on alarms selection
- Trend dump resolution: selectable for 1, 5, 10 or 30 min, and after each NIBP, PCWP and marker
- Alarm start: 30 s waveform print, alarm source annotation, 12 s waveform from memory, 8 s real-time waveform
- Retroactive printing: 12 s or off
- Easy insertion/removal of module without interrupting other monitoring

Direct function keys

Record Wave:	prints selected real-time waveforms
Print Trends:	prints trends in selected format
Stop:	stops printing

Dimensions and weight
Module size (WxDxH): 75x180x112 mm/3.0x7.1x4.4"
Weight: 0.9 kg/2 lbs

Technical specifications

Waveform printout:	selectable 1, 2 or 3 waveforms
Numerical printout:	HR, NIBP, P1, P2, P3, P4, T1, T2, Et/FiCO_2, Et/FiO_2, Et/FiAA, RR
Tabular trend printout:	HR, SpO_2, P1, NIBP and $EtCO_2$
Paper speed:	1, 6.25, 12.5, 25 mm/s
Paper width:	50 mm
Operating principle:	thermal array
Print resolution:	vertical 8 dots/mm horizontal 32 dots/mm at 25 mm/s

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Datex AS/3™ Memory Module, M-MEM

Memory module
Single width plug-in module including two PCMCIA card slots; one for patient data and one for record keeping configurations. Datalight® ROM-DOS™ operating system.

Dimensions and weight
Module size (WxDxH): 37x180x112 mm/1.5x7.1x4.4"
Weight: 0.4 kg/1 lbs

Memory Cards
Personal Computer Memory Card International Association (PCMCIA2.0), 68-pin standard compatible flash memory cards.

Card Capacity:	2 Mbytes
Physiological data storage capacity:	48 hours of continuous physiological trend data.

Microsoft's MS-DOS Flash File System 2.0 compatible file system.

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ROM-DOS is a trademark of Datalight, Inc. Copyright 1989-1994 Datalight Inc. All rights reserved.

Datex

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3 SHORT INSTRUCTIONS

Quick Guide

Preparations

a) Check that the power cord is connected.
b) Plug in the desired parameter modules.
c) Check the connection cable between the Central Unit and Airway Module, that the water trap is empty and properly attached. Connect the gas sampling line.

Start Monitoring

a) Turn the monitor ON from the Standby/On switch. If the monitor is already ON, push the RESET CASE key to erase previous patient data.
b) Attach the patient connection cables. This will automatically adjust the monitor display to the parameters being measured. Accessories must be properly cleaned before use.
Alarms are active and the parameter default settings are on when the patient is connected to the monitor.
c) Zero the invasive pressure channels by pushing the Zero key on the module.

In-Between Patients

a) Push the SILENCE ALARM key to avoid alarms during patient disconnection.
b) Remove patient connections
c) Print trends if desired.
d) Clear the monitor from previous patient data and reset alarm limits.
e) Empty the water trap container of the Airway Module.
f) Exchange the Y-piece and the airway adapter.

End Monitoring

a) Remove patient connections.
b) Switch to standby if the monitor will not be used.
c) Clean the monitor according to the cleaning instructions.

Principles

The Datex AS/3 Anesthesia Monitor can be operated either with the module keys or the Command Board keys.

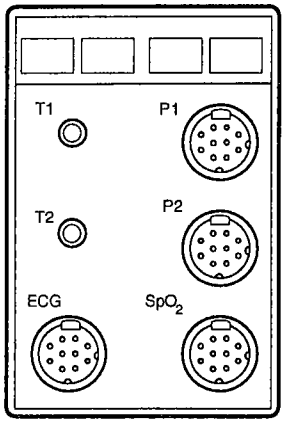
Module keys control a set of the most often used functions while the Command Board keys give access to all functions.

Module Keys

The Direct Function Keys on the module start a function immediately. The module keys are designed to make the most common anesthesia monitoring tasks easier and quicker to use.

The accessories have to be plugged to the respective module before module keys become operative.

Modules M-ESTP, M-ETP, M-EST



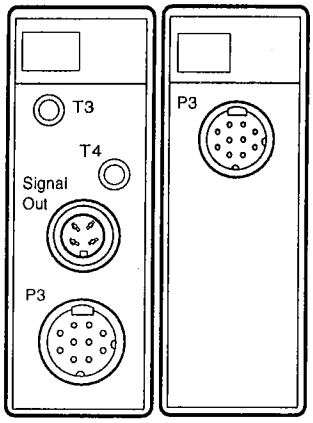
ECG Lead — Push to change the ECG lead.

Start Wedge — Displays the customized Wedge view and starts the wedge measurement.

Zero P1 — To zero invasive pressure 1.

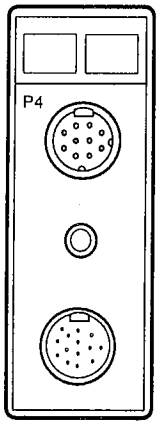
Zero P2 — To zero invasive pressure 2.

Pressure Temp Module, M-PT, Pressure Module, M-P



Zero P3 — To zero invasive pressure 3.

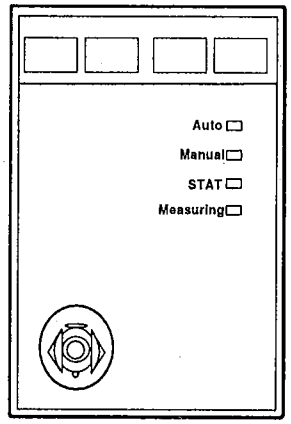
Cardiac Output Module, M-COP



Zero P4 — To zero invasive pressure 4.

Start C.O. — Displays the Cardiac Output display for setting up and starting C.O.

NIBP Module, M-NIBP



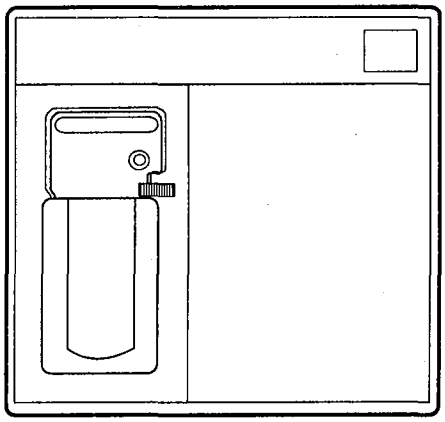
Auto On/Off — Starts and cancels automatic NIBP measurement with selected intervals.

Set Cycle Time — Changes NIBP inflation intervals.

STAT On/Off — Starts and stops continuous measurement for 5 minutes.

Start Cancel — Starts a single measurement and cancels any measurement.

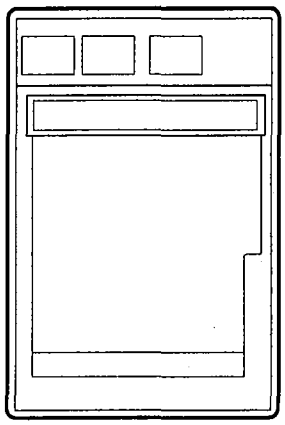
Airway Modules, G-AO, G-AOV



Select Agent

To select the anesthetic agent, HAL, ENF, ISO, SEV, DES.

Recorder Module, M-REC



Record Wave

To record selected real-time waveforms.

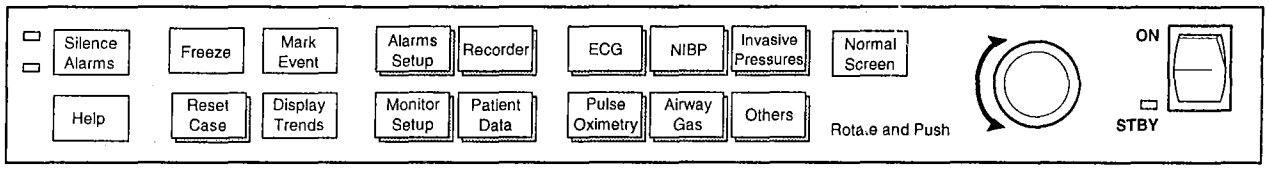
Print Trends

To print numerical, graphical or tabular trends.

Stop

To stop recording.

Command Board



Command Board Keys

Pushing a Command Board key displays a menu on the screen. The ComWheel is for making selections within the menus.

Silence Alarms

Silences an active alarm or pre-silences all alarms for 2 minutes. SILENCE ALARMS key also clears the alarm message field of all alarm messages. A yellow LED lit indicates YELLOW ALARM, a red LED lit indicates RED ALARM. Pushing the key once again will enable new alarms.

Help ▶

Initiates on-line help to assist you with the monitoring system and its functions. Press NORMAL SCREEN key to return back to monitoring mode.

Freeze ▶

Freezes the waveform sweep for 60 seconds. A message TRACES FROZEN is displayed in the middle of the waveform area. Press NORMAL SCREEN key or FREEZE key again to unfreeze the waveforms.

Reset Case ▶

Displays a menu in which you can reset trends, alarm limits and screen settings separately or all at once.

Mark Event ▶

Marks an event on the numerical trend display. Press MARK EVENT key. Values are marked with a running number.

Display Trends ▶

Displays graphical or numerical trends. Press NORMAL SCREEN key to return back to monitoring mode.

Alarms Setup ▶

Displays a menu to review the alarm situation and to adjust the alarm settings.

Monitor Setup ▶ Displays a menu for monitoring setups, such as configuring screen and units or setting time and date.

Recorder ▶ Displays a menu to start recording and to select the recorded parameters.

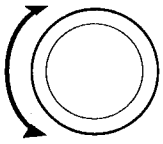
Patient Data ▶ Enables entering of patient height and weight and viewing of hemodynamic and oxygenation calculations. Also Other Site Alarm and Other Site View menus are accessed from Patient Data.

ECG ▶
Airway Gas ▶
NIBP ▶
Invasive Pressures ▶
Pulse Oximetry ▶

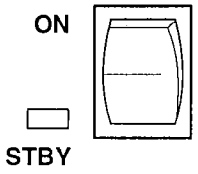
Displays a menu to adjust parameter settings.

Others ▶ Displays a menu to adjust other parameters, e.g. temperature and cardiac output.

Normal Screen ▶ Returns the display to normal monitoring mode from a menu or a special view. Normal screen can be configured to be either the waveform display or a trend display.



ComWheel: turn and push to make selections and adjustments in menus.



A green LED next to STBY indicate the monitor electrical status. The LED is lit when the monitor is connected to electrical mains and the monitor is on standby (STBY). When two displays are used the switch may be on standby but when the green LED is not lit the monitor is ON.

How to Use Menus

A menu is a list of functions or commands, displayed on the AS/3 monitor screen.

To display a menu, push one of the Command Board keys.

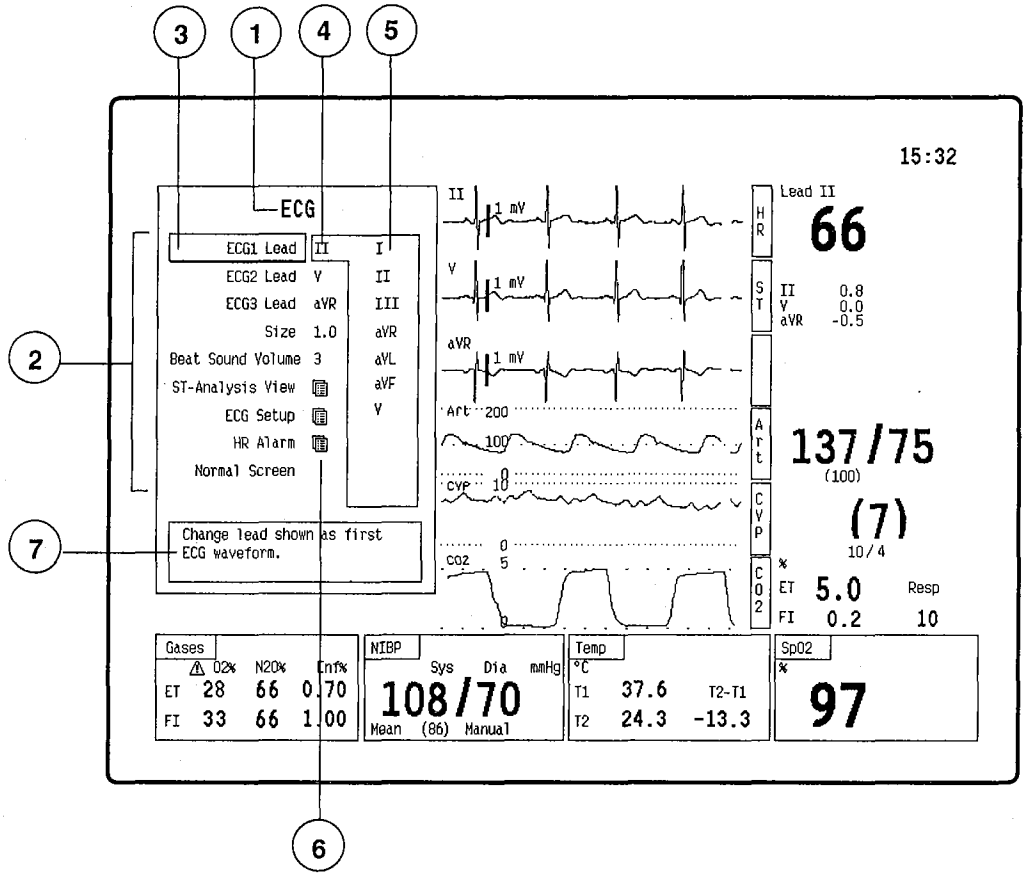


Figure 3-1 Menu

(1) Header of the menu

(2) List of menu selections

(3) Highlight to indicate the selection at hand

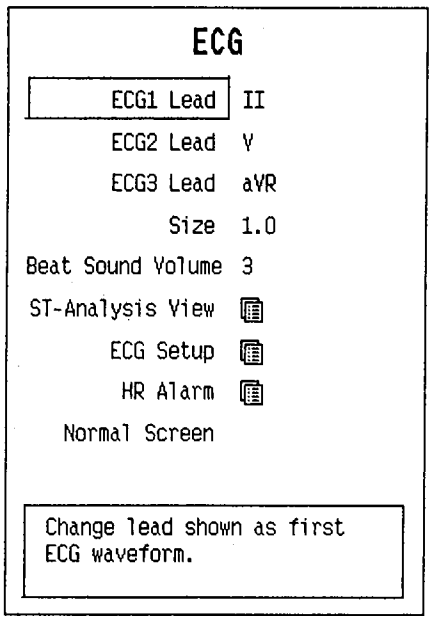
(4) Present selection, one previously chosen or the default value

(5) Adjustment window with other selection choices

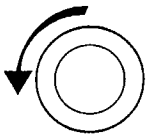
(6) Entry indicator to sub menus

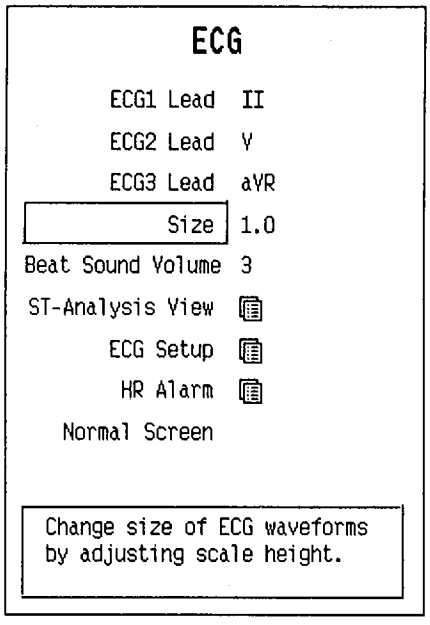
(7) On line help with short instructions

The adjustments in the menus are made with the ComWheel. For example, to make adjustments to the ECG display:

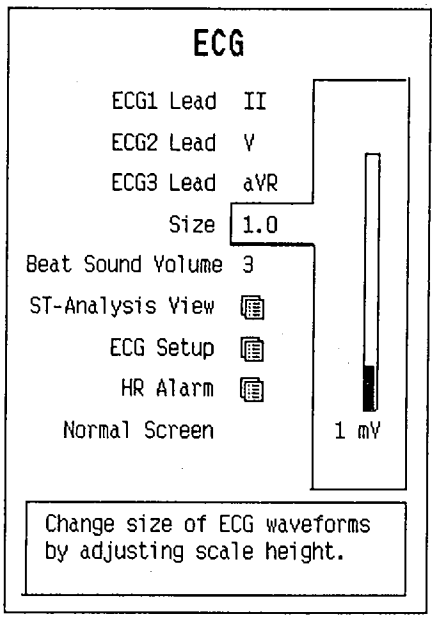


* Select the desired function by pressing the menu key.



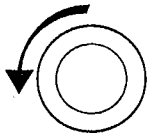


* Turn the ComWheel to move the highlight down on the menu to the desired selection.

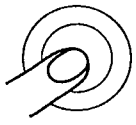


* Push the ComWheel to enter adjustment window or sub menu.

* Turn the ComWheel to choose the desired adjustment or selection in the window.



* Push the ComWheel to confirm the selection.



Push the NORMAL SCREEN key to return to normal monitoring display.

Sub Menus

Submenus are indicated by symbol. After the submenu is selected, it will appear stacked on the previous menu. The submenus contain less frequently used functions.

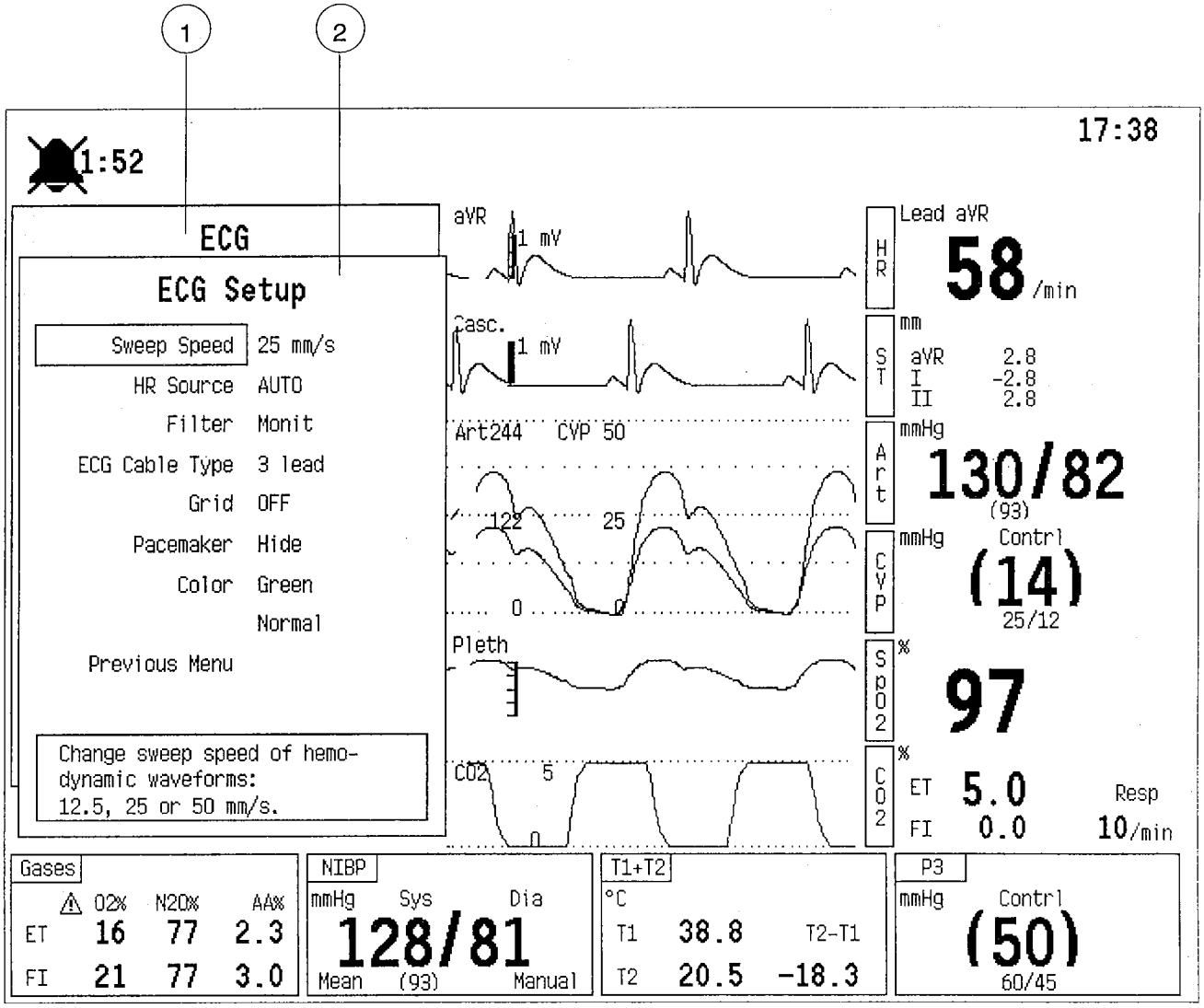
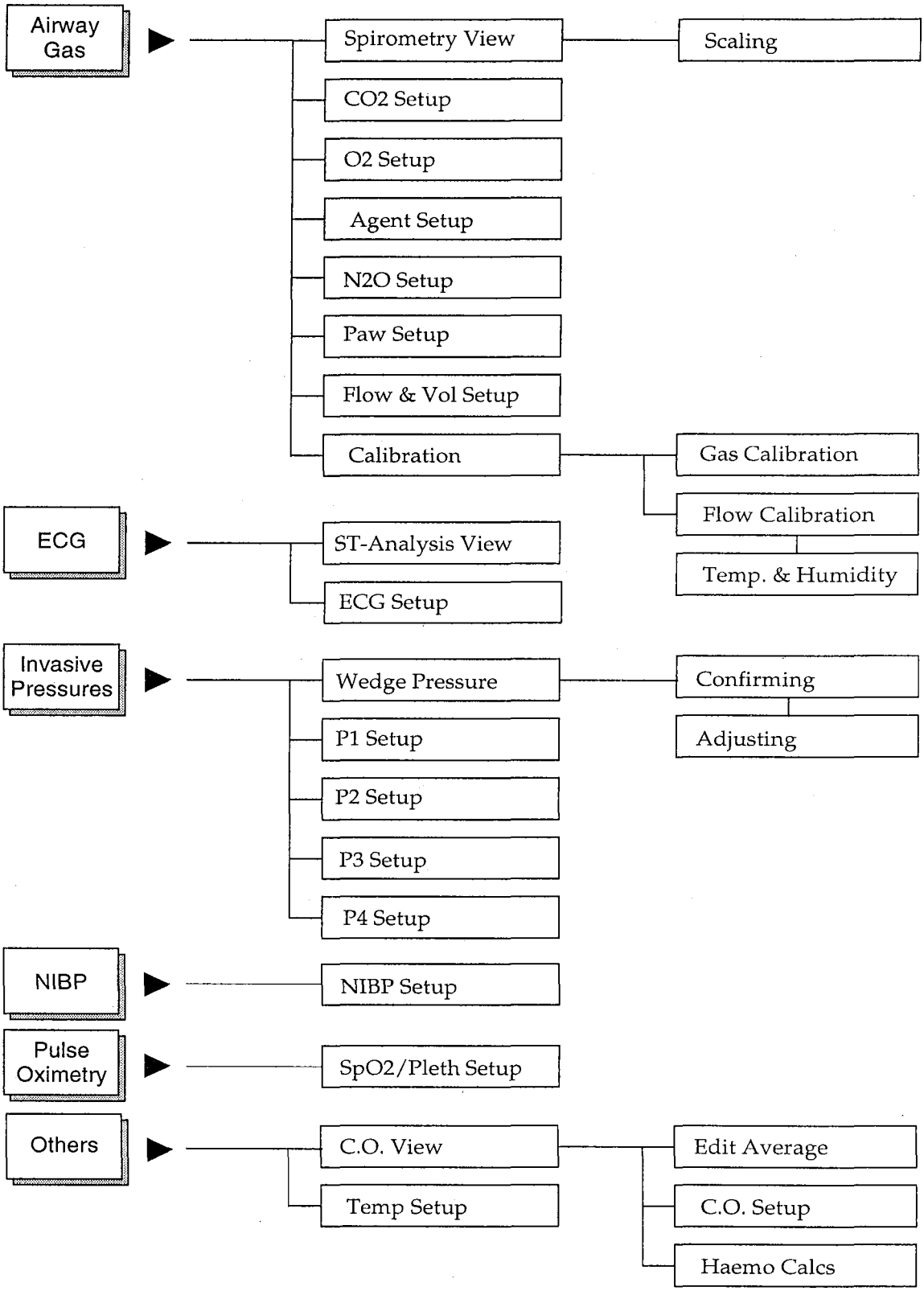
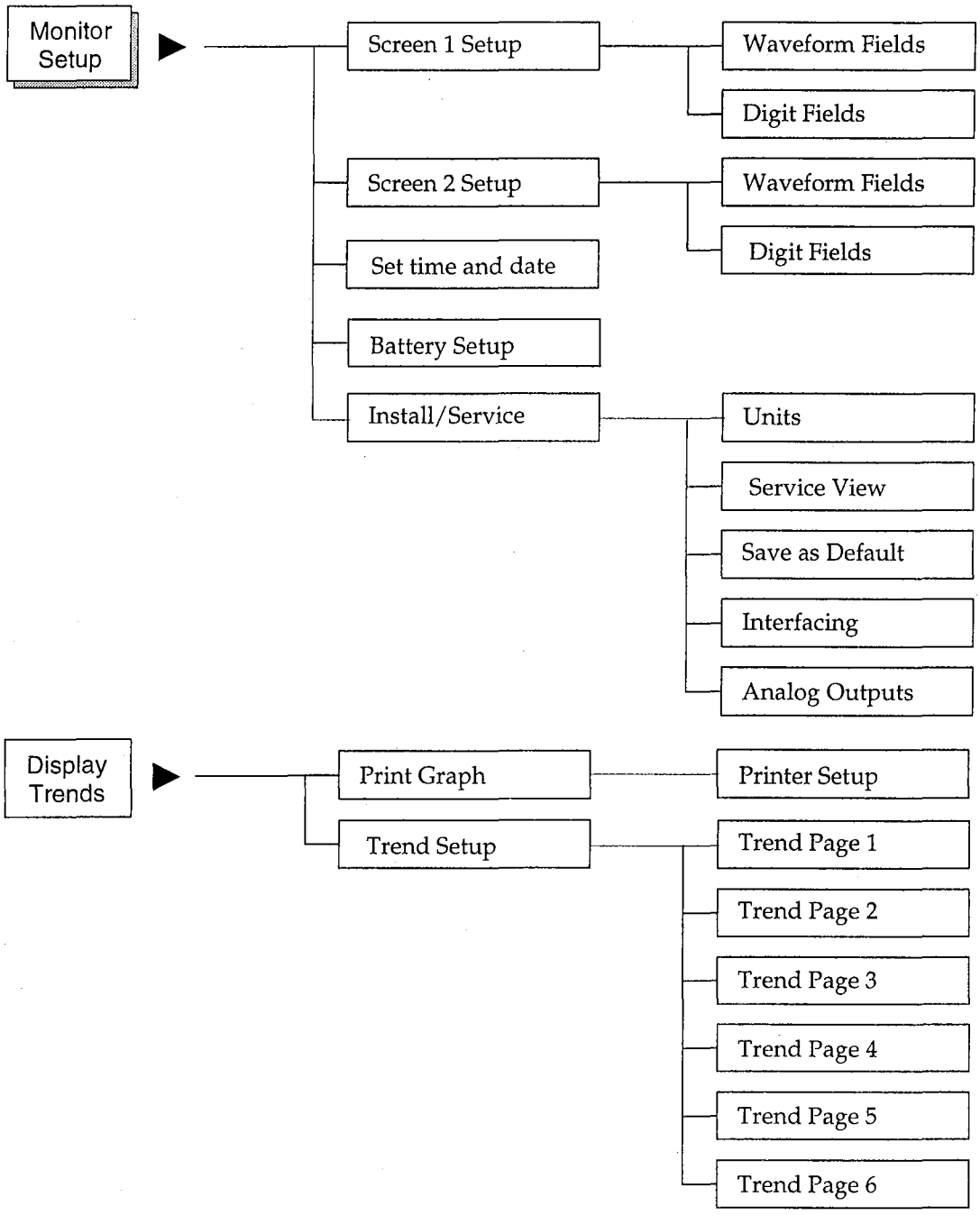


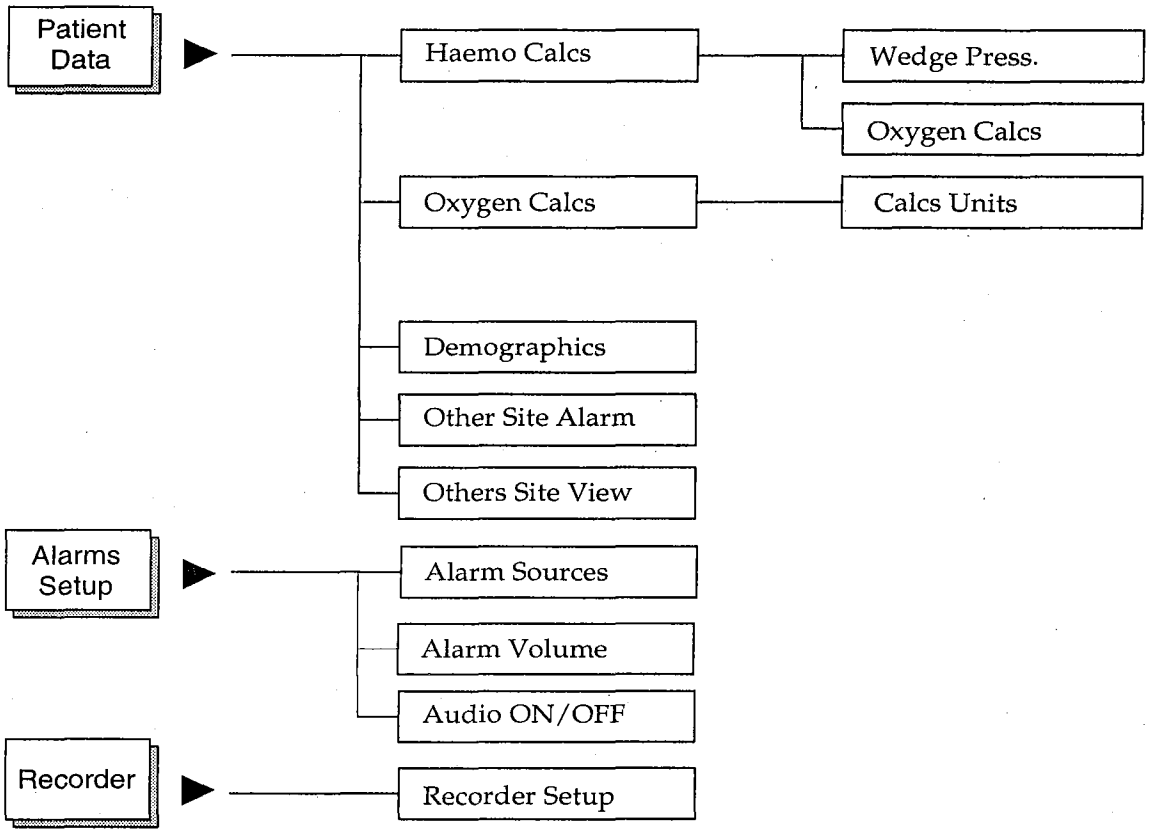
Figure 3-2 Sub Menu

(1) header of the previous menu
(2) Header of the submenu

On the following three pages are presented the Command Board key and the submenus of each menu.


Airway Gas
Spirometry View
Scaling
CO2 Setup
O2 Setup
Agent Setup
N2O Setup
Paw Setup
Flow & Vol Setup
Calibration
Gas Calibration
Flow Calibration
Temp. & Humidity
ECG
ST-Analysis View
ECG Setup
Invasive Pressures
Wedge Pressure
Confirming
Adjusting
P1 Setup
P2 Setup
P3 Setup
P4 Setup
NIBP
NIBP Setup
Pulse Oximetry
SpO2/Pleth Setup
Others
C.O. View
Edit Average
Temp Setup
C.O. Setup
Haemo Calcs


Monitor Setup
Screen 1 Setup
Waveform Fields
Digit Fields
Screen 2 Setup
Waveform Fields
Digit Fields
Set time and date
Battery Setup
Install/Service
Units
Service View
Save as Default
Interfacing
Analog Outputs
Display Trends
Print Graph
Printer Setup
Trend Setup
Trend Page 1
Trend Page 2
Trend Page 3
Trend Page 4
Trend Page 5
Trend Page 6


Patient Data
Haemo Calcs
Wedge Press.
Oxygen Calcs
Oxygen Calcs
Calcs Units
Demographics
Other Site Alarm
Others Site View
Alarms Setup
Alarm Sources
Alarm Volume
Audio ON/OFF
Recorder
Recorder Setup

What to Display Where

The monitor will automatically configure the display according to the parameters measured.

The user can however freely decide which waveforms and numerics are displayed, and where on the screen they are arranged.

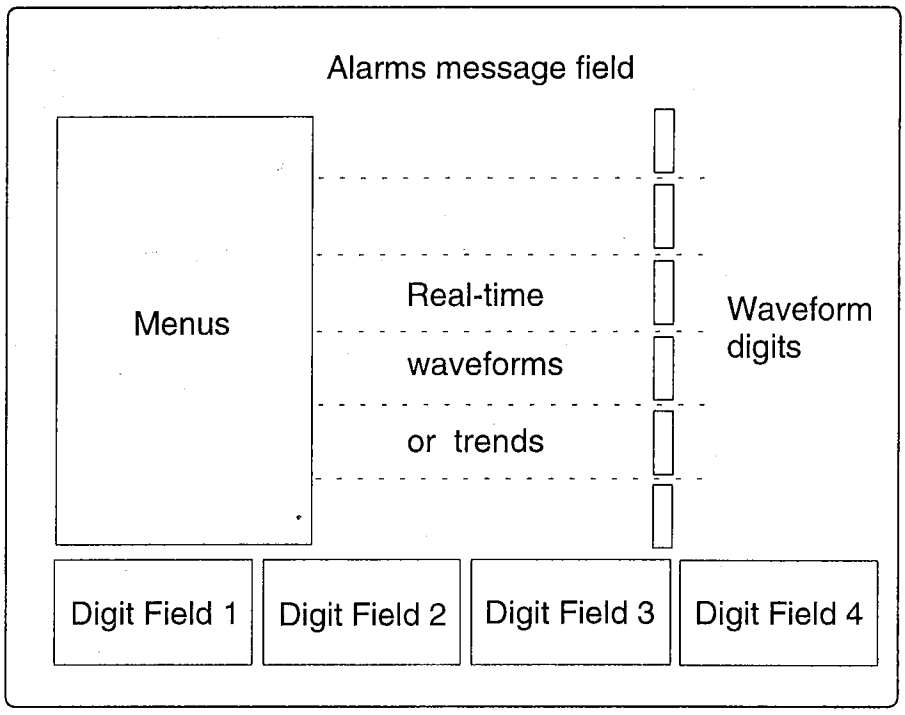


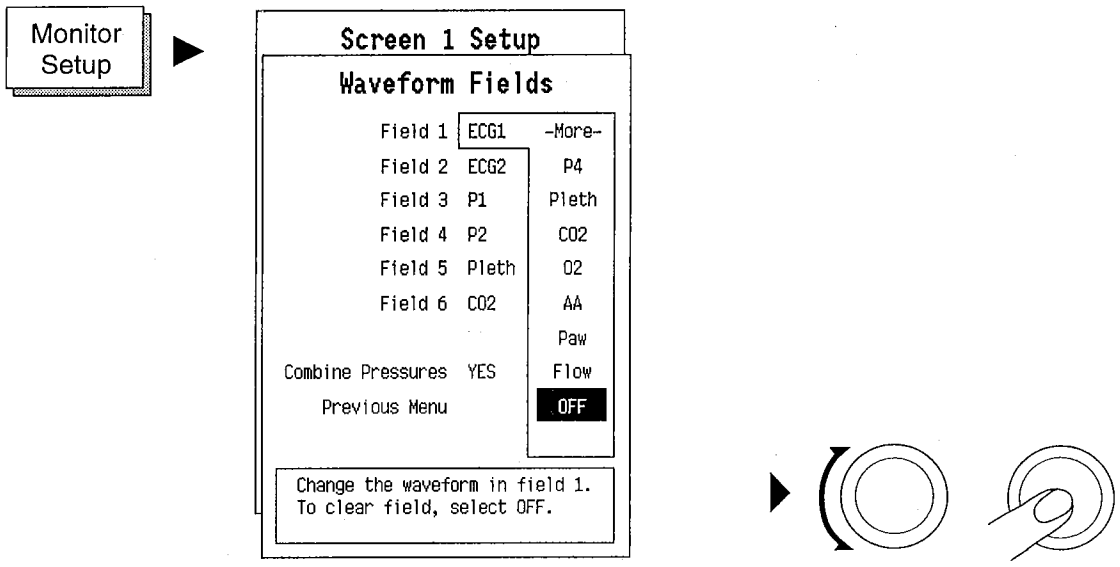
Figure 3-3 Display Fields

* Push the Monitor Setup key and select either Waveform Fields or Digit Fields.

If the Normal Screen is a trend display then the digit fields are not displayed at all.

The user can also save a certain display arrangement as part of the default settings so that the display will look the same every time the monitor is turned on. See Operator's Manual - Monitor Setup - Install/Service Adjustments.

Waveform Fields

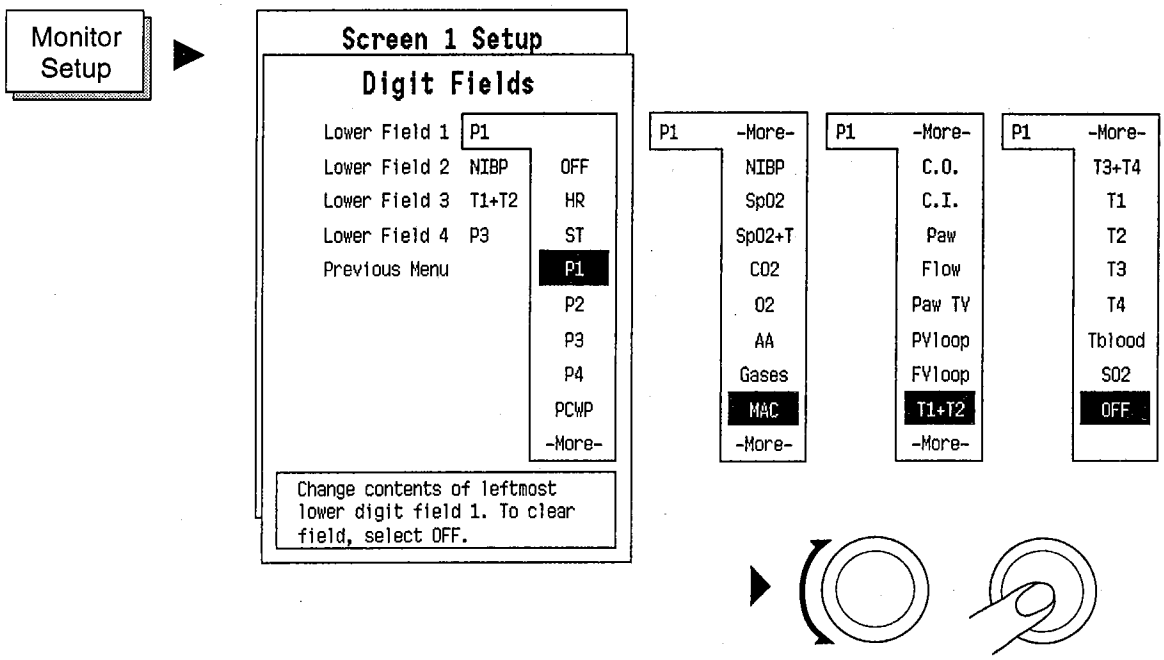


Selecting a waveform field automatically brings the corresponding numeric information to the right of the waveform. If you display less than six waveforms, the remaining waveforms are enlarged automatically.

You can combine invasive blood pressure waveforms by selecting YES at Combine Pressures.

Digit Fields

Four digit fields at the bottom of the screen are reserved for displaying numeric patient information.



Adjusting Alarm Limits

* Press Alarms Setup key to display the Alarms Setup menu.

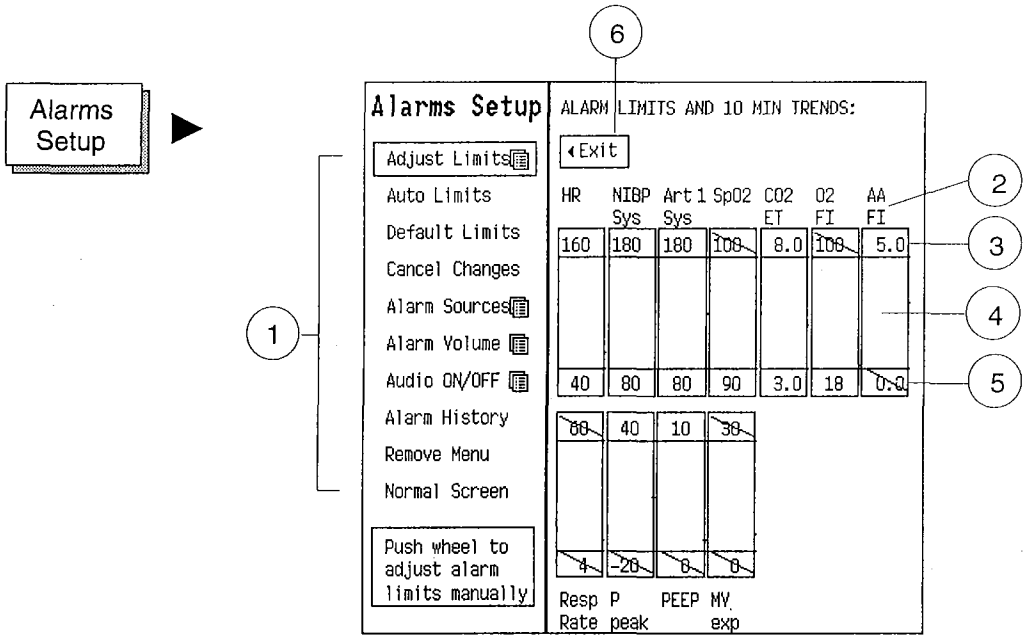


Figure 3-4 Alarms Setup View

(1) List of menu selections
(2) Parameter headings
(3) High alarm limit value
(4) 10 minute trend display of patient values
(5) Low alarm limit value
(6) Exit from the parameter alarm limit adjustment boxes back to alarms setup menu selections

If you desire to adjust individual parameter alarm limits:

* Select ADJUST LIMITS. The highlight appears at the HR high alarm limit.

* Turning the ComWheel and the highlight moves from one alarm limit to the next one parameter after the other.

* Push and turn the ComWheel to adjust the selected alarm limit. The highlight is replaced by a box around the alarm limit.

* Push the ComWheel when you have adjusted the alarm limit.

* Turn the ComWheel to move the highlight to the next alarm limit you want to adjust.

* When ready, select EXIT to return to the menu selections.

OR

For quick patient alarm adjustment select Auto Limits from the Alarms Setup menu. The alarm limits will be adjusted around the current patient values.

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4 ALARMS

Anesthesia Alarm System

The alarms are classified into three categories according to the priority in anesthesia: RED ALARM, YELLOW ALARM, and NOTE (white color). The priority of an alarm depends primarily upon the cause and the duration of the alarm condition, the priority increasing with the duration in a way that depends on the physiological significance. Thus e.g., ASYSTOLE advances rapidly to a RED priority, whereas APNEA is allowed a slightly longer duration.

Alarms are active also when the parameter is not selected on the screen unless the alarm source is turned off. See default settings presented in section Alarm Sources.

The following frame colors and tones are used to identify the categories:

Table 4-1 Alarm Indicators

VISUAL	AUDIO	MEANING
Red	3 + 2 beeps every 12s	Red alarm is used for life threatening situations
Yellow	Triple beep every 30 seconds	Yellow alarm is used when there is a serious problem but not life threatening
White	Single beep	NOTE - advisory and/or equipment related like LEADS OFF

When an alarm for the monitored parameter becomes active:

* The corresponding numerical value flashes with the background color signifying the alarm category. In some cases a message will also appear in the appropriate waveform field (Asystole and Apnea). The digit or waveform fields will show a more detailed message, e.g., PROBE OFF or TRANSDUCER OFF.

* An audible alarm is sounded.

* Messages appear in the order of priority on the message field at the top of the display.

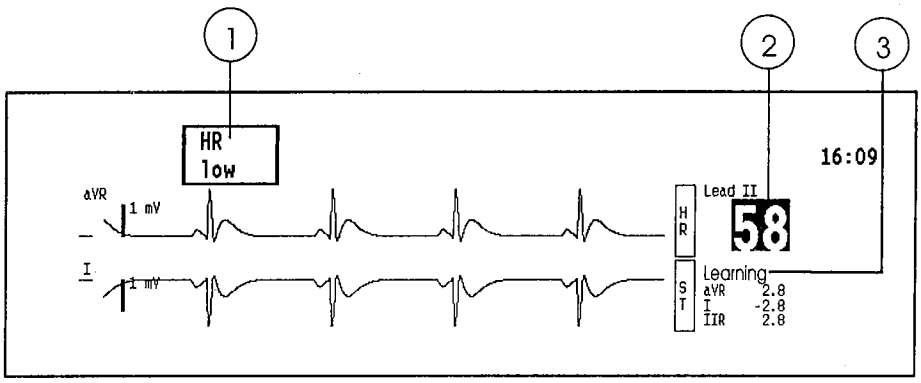


Figure 4-1 Screen Alarms

(1) Alarm message appears on the message field

(2) Parameter value flashes with the background color signifying the alarm category

(3) Notes are displayed in the parameter message field using the color of the parameter.

NOTE: If alarms are turned off and a power interruption occurs or the monitor is turned off up to 15 minutes, check alarm status before starting the monitoring again.

WARNING: PATIENT SAFETY: Always make sure that alarm limits are set and alarms are on when monitoring a patient.

Smart Start Alarms

Alarms are automatically active once the patient connection cables are attached. Individual alarms have their own specific requirements before they become active:

Asystole alarm requires five heart beats, apnea five breaths to be activated. The invasive pressures require to be within alarm limits for 20 seconds after zeroing.

Silencing Audible Alarms for 2 Minutes

Press the SILENCE ALARMS key.

Audible alarms can be silenced for 2 minutes. The alarms can also be pre-silenced for 2 minutes.

FiN_2O>82%, FiO_2<18%, EtO_2 and Paw high alarms are silenced for 20 seconds.

A Silence Alarms indicator appears on the top left corner of the screen with a countdown timer displaying the remaining audio suppression time. The message field at the top of the display will be cleared of all the previous alarm and note messages. The visual alarms in the digit and waveform fields, however, will remain as long as the alarm condition is active.

NOTE: Pressing the SILENCE ALARMS key during the 2-minute silencing period will reactivate the new possibly upcoming audible alarms.

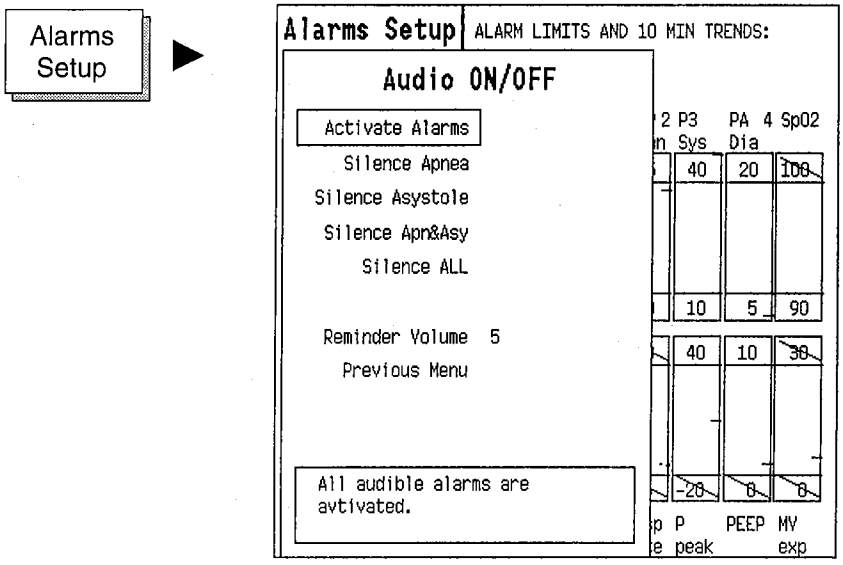
During the 2-minute silencing period new upcoming alarms or alarm priority changes still appear in the message field.

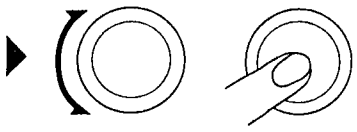
WARNING: PATIENT SAFETY: Do not silence audible alarms without providing continuous, direct observation of the patient.

Turning Off Audible Alarms

For special cases, such as open heart surgery or lung operations, it may be desirable to suppress certain audible alarms entirely. This can be done in the Alarms Setup sub menu. Also selecting "Cardiac Bypass ON" silences apnea and asystole alarms.

You can select: SILENCE APNEA, SILENCE ASYST. (asystole), SILENCE APN & ASY or SILENCE ALL.
A message: "!! AUDIO OFF !! until manually activated again" appears in the on-line help for Audio Alarms menu. If an active alarm is suppressed, the monitor will give a reminder beep every 2 minutes. The volume of the reminder beep can be adjusted in AUDIO ON/OFF menu.





WARNING: PATIENT SAFETY: Do not turn off audible alarms without providing continuous, direct observation of the patient.

Alarms Setup and Adjustments

Patient alarm limits are set using the Alarms Setup menu. You can set high and low alarm limits, set alarm volume, permanently silence alarms and view alarm status (a 10-minute trend).

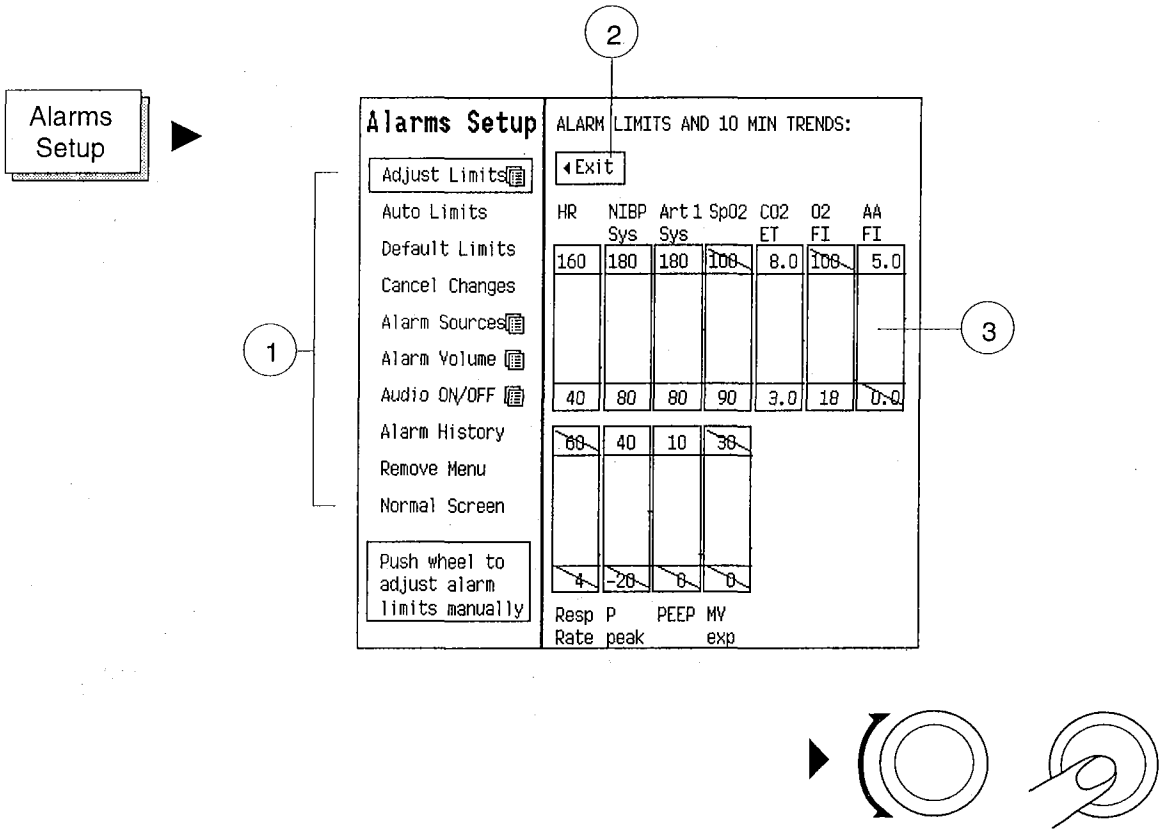


Figure 4-3 Alarms Setup View

(1) List of selections
(2) Exit from the alarm limit adjustment area back to Alarms Setup menu
(3) Parameter box with high and low limit values with a 10-minute trend displayed to show the current status

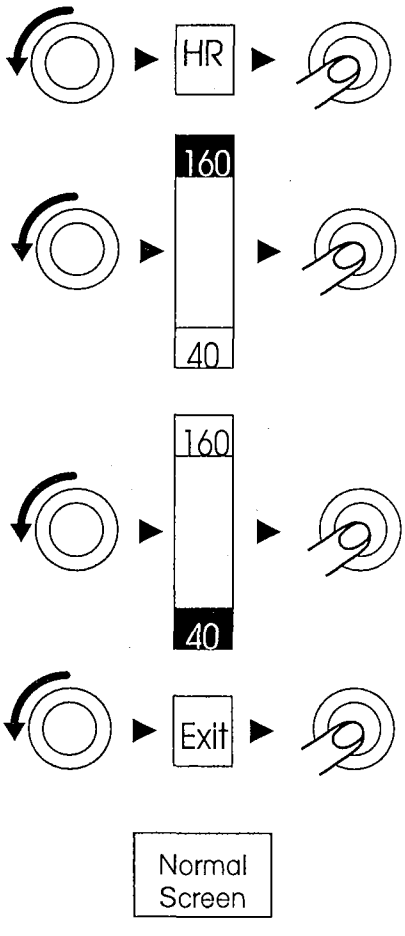
NOTE: When the Airway Module is not installed, the parameter boxes for the gases do not appear on the Alarms Setup page.

ADJUST LIMITS

Allows the individual adjustment of parameter limits. This adjustment can also be accessed through the parameter menu.

To adjust the alarm limit:

* Select Adjust Limits
* Turn the ComWheel to highlight the desired high or low alarm limit.
* Push the ComWheel to select the alarm limit you want to adjust. The highlight is replaced with a box.
* Turn the ComWheel to adjust the alarm limit either up or down.
* Push the ComWheel to select and confirm the adjusted alarm limit.
* Turn the ComWheel to move the highlight either to the next alarm limit or to the EXIT box.
* Push the ComWheel
* Press NORMAL SCREEN key to return to normal monitoring mode.



AUTO LIMITS

Auto limits are calculated from the displayed patient reading at the point of time when auto limits are selected. These limits enable close patient control with individual alarms.

DEFAULT LIMITS

Sets the alarms to the default alarm limits.

NOTE: Alarm limits can be changed to default limits in the Alarms Setup menu or also in the Reset Case menu by resetting the alarms. Default limits can be changed in the Installation menu. See Installation Manual, Chapter Configuration, for more information.

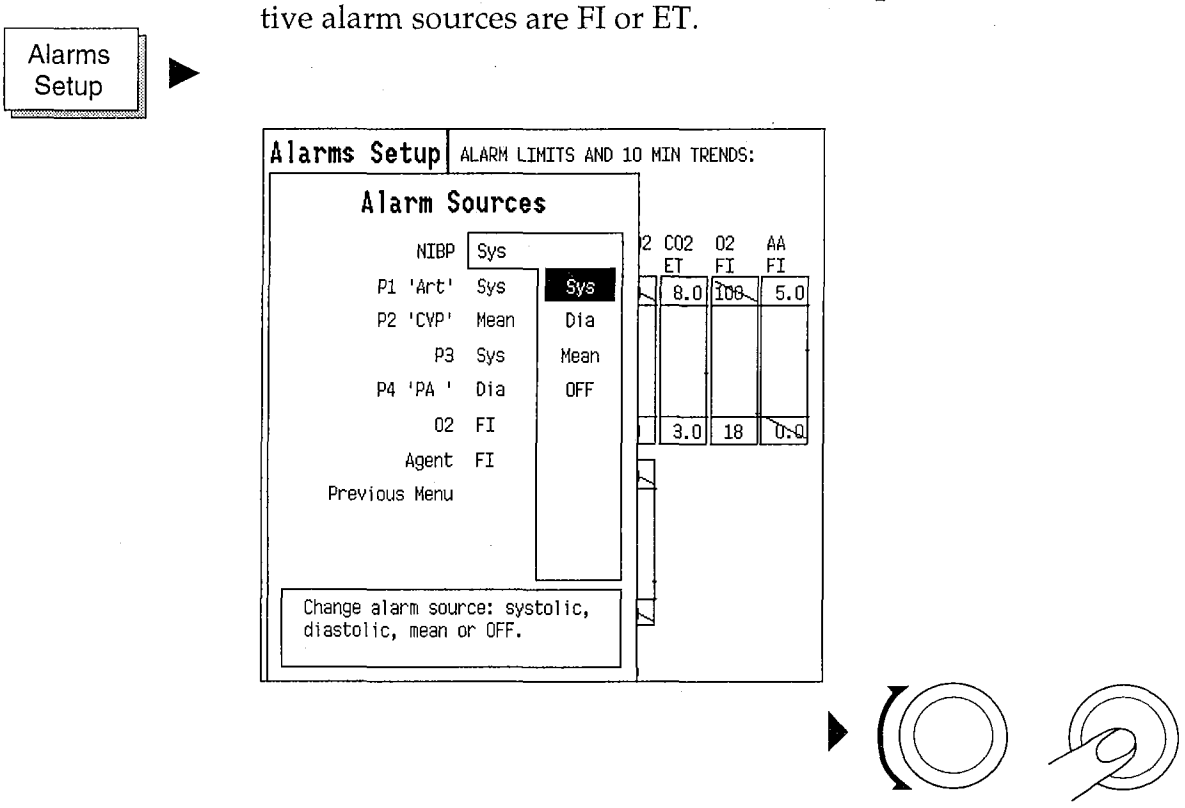
The default limits are listed in a table at the end of this chapter.

CANCEL CHANGES

Returns all the values to those that were valid when the Alarms Setup menu was entered, if you have not already exited the menu.

ALARM SOURCES

NIBP, P1, P2, P3, P4, O_2, and AA alarms have alternative sources. For the pressures, the alternatives are Systolic, Diastolic, Mean pressure or OFF. If OFF is selected, then the parameter box with the 10 minute trend is not displayed. For O_2 and AA the alternative alarm sources are FI or ET.



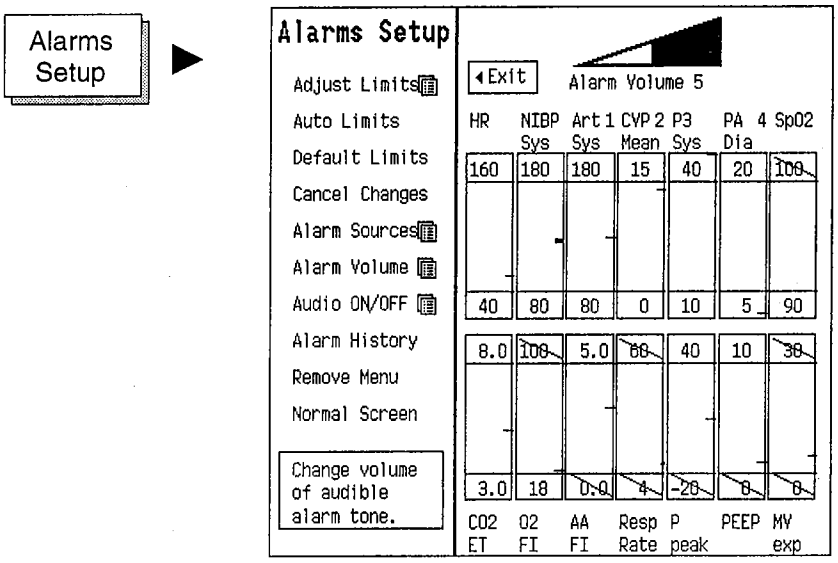
The alarm source is selected in the Alarm Sources sub menu under Alarms Setup menu.

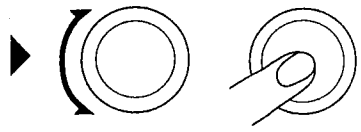
The alarm sources are listed in a table at the end of this chapter.

ALARM VOLUME

The volume of the audio alarms can be adjusted if required. The range is from 1 (soft) to 10 (loud).

NOTE: Audio alarms cannot be totally silenced using the audio volume function.





AUDIO ON/OFF

Activate Alarms = Silenced alarms are activated.

Silence Apnea = Apnea alarm as well as CO_2, respiration rate and minute volume limit alarms are silenced permanently.

Silence Asystole = Asystole alarm is silenced. If the HR source is ECG, the HR limit alarms are also silenced permanently.

Silence apnea & asy = both of above

Silence all = All alarms except FiO_2<18%, $FiNO_2$>82% and $EtCO_2$ alarms are silenced permanently.

ALARM HISTORY

Displays a list of the last 10 alarms. The alarm messages with respective times are displayed. Push the ComWheel to redisplay the Alarms Setup menu.

REMOVE MENU

Only the alarm limits and 10 minute trends are displayed.

Alarm Outputs

Automatic Recording

An automatic alarm recording is possible for asystole, HR and pressure alarms. When the alarm reaches red alarm the recorder will print the ECG + P1 waveforms.

Other Site Alarm

All alarms will immediately be transferred to another AS/3 monitor or an Anesthesia Information Centre if a network is installed.

To have Other Site Alarm:

* Push Patient Data key
* Select Other Site Alarm
* Select one of the sites on the list.

Alarm Tables

Alarm Sources

Table 4-2 Alarm Sources

Alarme Source	Default selection in brackets
P1	(Sys) Dia mean OFF
P2	Sys Dia mean (OFF)
P3	Sys Dia mean (OFF)
P4	Sys Dia mean (OFF)
Art	(Sys) Dia mean OFF
ABP	Sys Dia mean (OFF)
CVP	Sys Dia mean (OFF)
PA	Sys Dia mean (OFF)
RAP	Sys Dia mean (OFF)
RVP	Sys Dia mean (OFF)
LAP	Sys Dia mean (OFF)
ICP	Sys Dia mean (OFF)
NIBP	(Sys) Dia mean OFF
O2	Et (Fi)
AA	Et (Fi)

Default Limits

The AS/3 Anesthesia Monitor is delivered with a certain set of alarm limits, so called factory default limits. These are listed for each parameter in the following tables.

Changing these settings is done in the Monitor Setup submenu Install/Service. A more detailed procedure is explained in the AS/3 Anesthesia Monitor Installation Manual.

We recommend not to change the alarm limit settings without the common consent of all users. Alarm limits are an important safety feature of the monitor and everybody should be aware of changes to them.

If you do change the alarm limit settings we recommend you to write the new limits in the following tables.

Table 4-3 Alarm Defaults HR

Parameter		Min-Max Limit	Factory Default	User Default
HR	High Low	250 30	160 40	
Pulse Oximetry	High Low	100%, OFF 50%	OFF 90	
NIBP Sys	High Low	265, OFF OFF, 15	180 80	
Mean	High Low	265, OFF OFF, 15	140 60	
Dia	High Low	265, OFF OFF, 15	100 40	
Alarm Volume	High Low	10 1	5	
Reminder Volume	High Low	10 0	5	

Table 4-4 Alarm Defaults Inv-P1

Parameter		Min-Max Limit	Factory Default	User Default
Inv-P1 Sys	High	300, OFF	180	
	Low	OFF, -40	80	
Mean	High	300, OFF	140	
	Low	OFF, -40	60	
Dia	High	300, OFF	100	
	Low	OFF, -40	40	
Inv-P2 Sys	High	300, OFF	20	
	Low	OFF, -40	5	
Mean	High	300, OFF	15	
	Low	OFF, -40	0	
Dia	High	300, OFF	10	
	Low	OFF, -40	-5	
Inv-P3 Sys	High	300, OFF	40	
	Low	OFF, -40	10	
Mean	High	300, OFF	30	
	Low	OFF, -40	5	
Dia	High	300, OFF	20	
	Low	OFF, -40	5	
Inv-P4 Sys	High	300, OFF	40	
	Low	OFF, -40	10	
Mean	High	300, OFF	30	
	Low	OFF, -40	5	
Dia	High	300, OFF	20	
	Low	OFF, -40	5	
Art Sys	High	300, OFF	180	
	Low	OFF, -40	80	
Mean	High	300, OFF	140	
	Low	OFF, -40	60	
Dia	High	300, OFF	100	
	Low	OFF, -40	40	
ABP Sys	High	300, OFF	180	
	Low	OFF, -40	80	
Mean	High	300, OFF	140	
	Low	OFF, -40	60	
Dia	High	300, OFF	100	
	Low	OFF, -40	40	

Table 4-5 Alarm Defaults CVP

Parameter		Min-Max Limit	Factory Default	User Default
CVP Sys	High	300, OFF	20	
	Low	OFF, -40	5	
Mean	High	300, OFF	15	
	Low	OFF, -40	0	
Dia	High	300, OFF	10	
	Low	OFF, -40	0	
PA Sys	High	300, OFF	40	
	Low	OFF, -40	10	
Mean	High	300, OFF	30	
	Low	OFF, -40	5	
Dia	High	300, OFF	20	
	Low	OFF, -40	5	
RAP Sys	High	300, OFF	20	
	Low	OFF, -40	5	
Mean	High	300, OFF	15	
	Low	OFF, -40	0	
Dia	High	300, OFF	10	
	Low	OFF, -40	0	
RVP Sys	High	300, OFF	40	
	Low	OFF, -40	10	
Mean	High	300, OFF	35	
	Low	OFF, -40	5	
Dia	High	300, OFF	20	
	Low	OFF, -40	0	
LAP Sys	High	300, OFF	30	
	Low	OFF, -40	5	
Mean	High	300, OFF	20	
	Low	OFF, -40	5	
Dia	High	300, OFF	20	
	Low	OFF, -40	0	
ICP Sys	High	300, OFF	20	
	Low	OFF, -40	0	
Mean	High	300, OFF	15	
	Low	OFF, -40	0	
Dia	High	300, OFF	10	
	Low	OFF, -40	0	

Table 4-6 Alarm Defaults Et CO2

Parameter		Min-Max Limit	Factory Default	User Default
Et CO2	High Low	15, OFF OFF, 0	8.0% 3.0%	
Fi CO2		1, 2, 3, OFF		
Fi O2	High Low	100, OFF 18	OFF 18%	
Et O2	High Low	100, OFF 10	OFF 10%	
Fi N2O	High Low		82%	
Fi AA	High Low	15 OFF, 0	5.0% OFF	
Et AA	High Low	15 OFF, 0	3.0% OFF	
Fi Hal	High Low	15 0	2.2% OFF	
Et Hal	High Low	15 0	1.5% OFF	
Fi Enf	High Low	15 0	5.1% OFF	
Et Enf	High Low	15 0	3.4% OFF	
Fi Iso	High Low	15 0	3.4% OFF	
Et Iso	High Low	15 0	2.3% OFF	
Fi Des	High Low	30 0	18.0% OFF	
Et Des	High Low	30 0	12.0% OFF	
Fi Sev	High Low	15 0	5.1% OFF	
Et Sev	High Low	15 0	3.4% OFF	

Table 4-7 Alarm Defaults SSS

Respiratio Rate	High Low	60, OFF OFF, 4	OFF OFF	
P Peak cmH2O	High Low	100 -20	40 OFF	
PEEP cmH2O	High Low	60 0	10 OFF	
MV exp	High Low	30 1	OFF OFF	

AUTO Alarm Limits

Automatic alarm limits are based on the patient value when the AUTO limit was selected.

Table 4-8 Auto Limits HR

Alarm Source		AUTO limit Patient value
HR	High Low	HR x 1.25 HR x 0.75
Pulse Oximetry	High Low	 SpO2 - 5%
NIBP Sys	High Low	NIBP x 1.25 + 10 NIBP x 0.75 - 10
Mean	High Low	NIBP x 1.25 + 10 NIBP x 0.75 - 10
Dia	High Low	NIBP x 1.25 + 10 NIBP x 0.75 - 10

Table 4-9 Auto Limits Et CO2

Alarm Source		AUTO limits Patient value
Et CO2	High Low	EtCO2 + 1% EtCO2 - 1%
Respiratio Rate	High Low	RR x 1.25 + 2 RR x 0.75 - 2
Ppeak	High Low	Ppeak + 10 Ppeak - 10
PEEP	High Low	PEEP + 5
MV exp	High Low	MVexp + 2 MVexp - 2

Table 4-10 Auto Limits Inv-P1

Alarm Source			AUTO limits Patient value
Inv-P1	Sys	High Low	P1 x 1.25 + 10 P1 x 0.75 - 10
	Mean	High Low	P1 x 1.25 + 10 P1 x 0.75 - 10
	Dia	High Low	P1 x 1.25 + 10 P1 x 0.75 - 10
Inv-P2	Sys	High Low	P2 x 1.25 + 5 P2 x 0.75 - 5
	Mean	High Low	P2 x 1.25 + 5 P2 x 0.75 - 5
	Dia	High Low	P2 x 1.25 + 5 P2 x 0.75 - 5
Inv-P3	Sys	High Low	P3 x 1.25 + 5 P3 x 0.75 - 5
	Mean	High Low	P3 x 1.25 + 5 P3 x 0.75 - 5
	Dia	High Low	P3 x 1.25 + 5 P3 x 0.75 - 5
Inv-P4	Sys	High Low	P4 x 1.25 + 10 P4 x 0.75 - 10
	Mean	High Low	P4 x 1.25 + 10 P4 x 0.75 - 10
	Dia	High Low	P4 x 1.25 + 10 P4 x 0.75 - 10
Art	Sys	High Low	P1 x 1.25 + 10 P1 x 0.75 - 10
	Mean	High Low	P1 x 1.25 + 10 P1 x 0.75 - 10
	Dia	High Low	P1 x 1.25 + 10 P1 x 0.75 - 10
ABP	Sys	High Low	P1 x 1.25 + 10 P1 x 0.75 - 10
	Mean	High Low	P1 x 1.25 + 10 P1 x 0.75 - 10
	Dia	High Low	P1 x 1.25 + 10 P1 x 0.75 - 10

Table 4-11 Auto Limits CVP

Alarm Source			AUTO limits Patient value
CVP	Sys	High Low	CVP x 1.25 + 5 CVP x 0.75 -5
	Mean	High Low	CVP x 1.25 + 5 CVP x 0.75 -5
	Dia	High Low	CVP x 1.25 + 5 CVP x 0.75 -5
PA	Sys	High Low	PA x 1.75 + 10 PA x 0.75 - 10
	Mean	High Low	PA x 1.75 + 10 PA x 0.75 - 10
	Dia	High Low	PA x 1.75 + 10 PA x 0.75 - 10
RAP	Sys	High Low	RAP x 1.25 + 5 RAP x 0.75 -5
	Mean	High Low	RAP x 1.25 + 5 RAP x 0.75 -5
	Dia	High Low	RAP x 1.25 + 5 RAP x 0.75 -5
RVP	Sys	High Low	RVP x 1.75 + 10 RVP x 0.75 - 10
	Mean	High Low	RVP x 1.75 + 10 RVP x 0.75 - 10
	Dia	High Low	RVP x 1.75 + 10 RVP x 0.75 - 10
LAP	Sys	High Low	LAP x 1.25 + 5 LAP x 0.75 -5
	Mean	High Low	LAP x 1.25 + 5 LAP x 0.75 -5
	Dia	High Low	LAP x 1.25 + 5 LAP x 0.75 -5
ICP	Sys	High Low	ICP x 1.25 + 5 ICP x 0.75 -5
	Mean	High Low	ICP x 1.25 + 5 ICP x 0.75 -5
	Dia	High Low	ICP x 1.25 + 5 ICP x 0.75 -5

Datex

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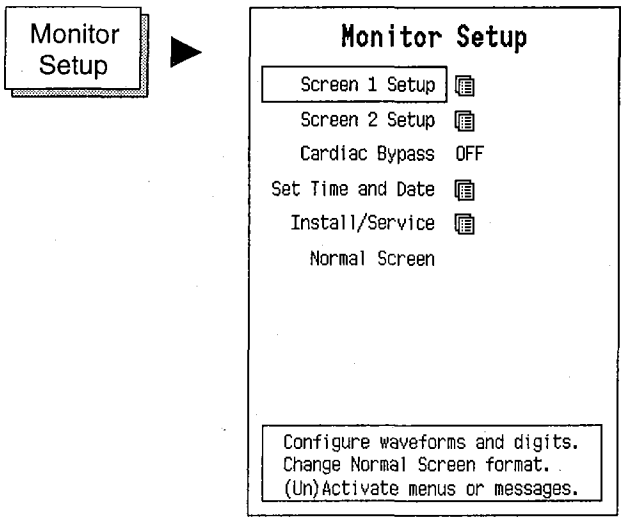
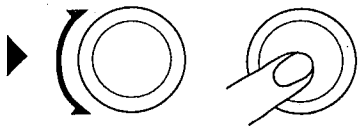
5 MONITOR SETUP

In the Monitor Setup menu you can change the displayed information by modifying waveform fields, digit fields, and you can also set the time and date and access the Install/Service menu.





NOTE: The adjustments made in this menu are only valid until the RESET CASE key is pressed and screen settings are reset or 15 minutes after the monitor is turned off. Time and date are stored permanently. If you want to make permanent screen changes, please see the Chapter Configuration in the Installation Manual.

Screen Setup

The monitor will automatically configure the display according to the parameters measured.

The user can however freely decide which waveforms and numerics are displayed, and where on the screen they are arranged.

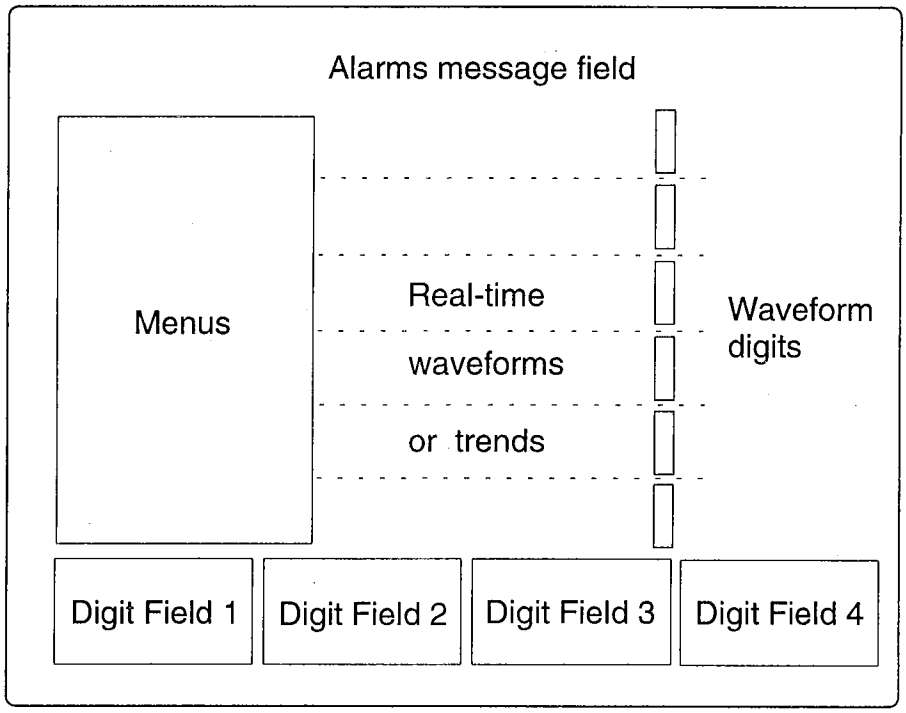
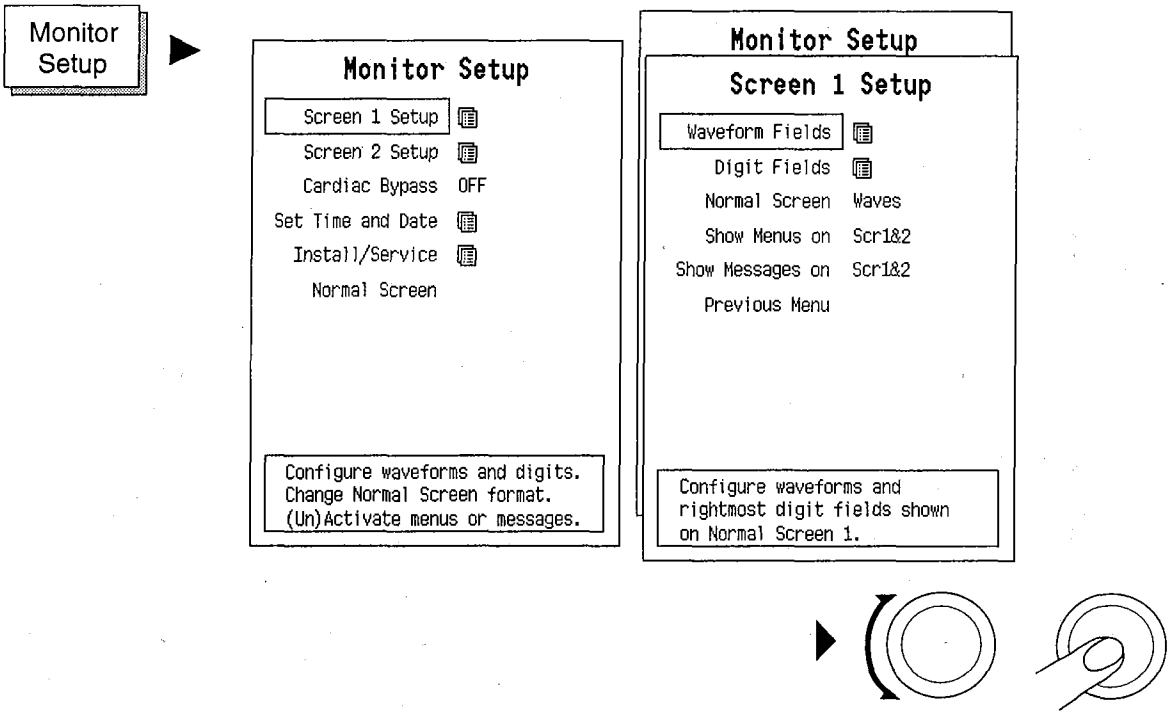


Figure 5-1 Display Fields

* Push the Monitor Setup key and select which screen you want to configure.



Two different displays can be used simultaneously in the system. Both displays can be configured separately.

Waveform and digit fields can be configured independently while menus and messages can be displayed on either one or both. Menus and messages will be displayed on at least the other display.

The secondary display or screen two is typically used for displaying patient information to the surgeon or the perfusionist. For this purpose the menus and messages can be removed to prevent distraction.

* At the Screen Setup menu select either Waveform Fields or Digit Fields.

The user can also save a certain display arrangement as part of the default settings so that the display will look the same every time the monitor is turned on. See Monitor Setup - Install/Service Adjustments.

Modifying Waveform Fields

Up to six waveforms can be displayed at a time.

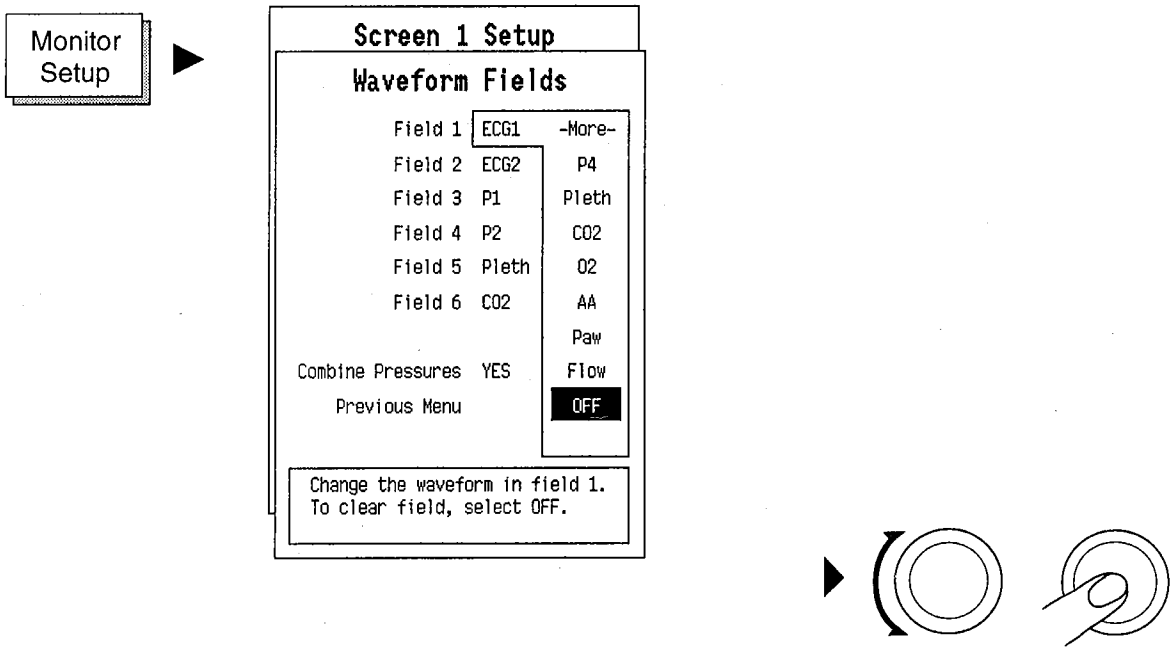
Waveforms appear and disappear automatically when modules are connected or disconnected. The invasive pressure waveforms are displayed only when the transducer is connected to the module.

When fewer than six waveforms are displayed, the remaining waveforms are enlarged to fill the entire waveform area.

Selecting Combine Pressures in the Waveform Fields menu displays invasive pressures in the same field with individual scales.

Changing the waveform also changes the numerical field to the right of the waveform.

Using a 5-leadwire cable, up to three different ECG leads can be displayed simultaneously.



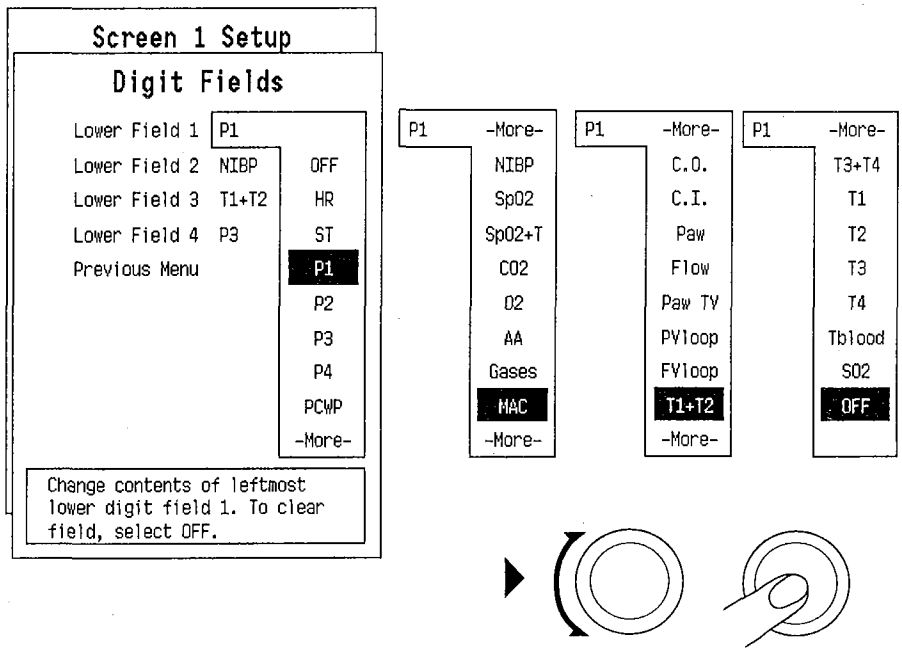
Modifying Digit Fields

Patient data may be displayed in up to four number fields, called digit fields, located on the lower part of the screen. The fields are numbered from left to right. You may change or turn off each of these fields.

If a digit field is turned OFF the digit field to it's left is automatically enlarged to fill the space.

Before modifying the digit fields, check that the desired parameter module is plugged in.

If the Normal Screen is a trend display then the digit fields are not displayed at all.



Cardiac Bypass

Cardiac Bypass ON/OFF

In cardiac by-pass mode

* asystole and apnea alarms are disabled
* by-pass -message is displayed
* the display is changed to by-pass mode (if configuration is separately changed and saved for by-pass mode)

Creating a Cardiac Bypass Display

The original display settings are similar for normal monitoring and by-pass mode. To make a different cardiac by-pass display:

1 Select Cardiac Bypass mode ON

2 Make all desired changes using the normal configuration and setup functions.

3 When ready, select Monitor Setup.

4 Select Install/Service.

5 Select Password.

6 Select Save As Defaults.

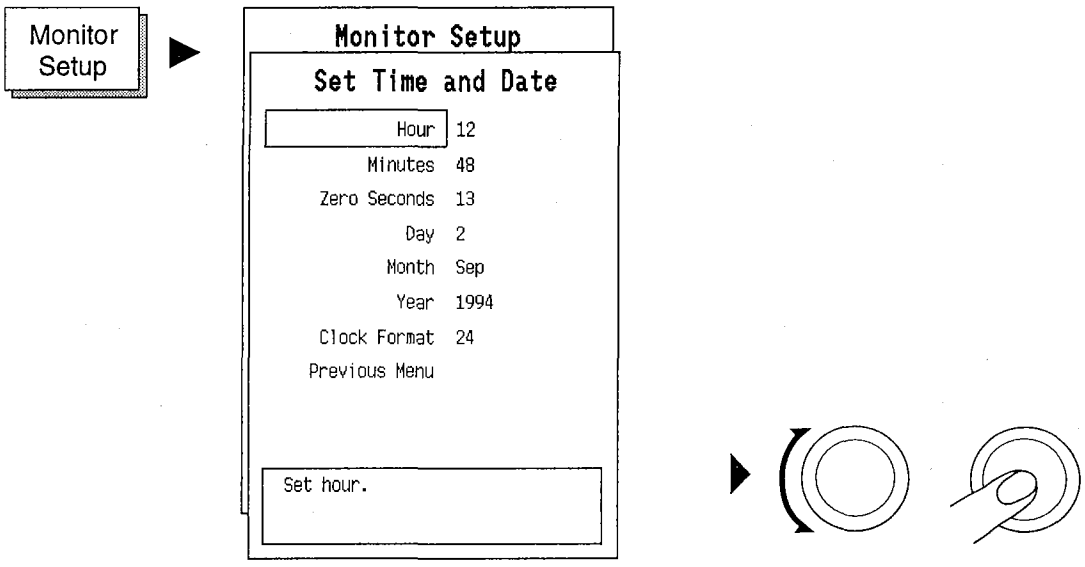
The monitoring mode used is displayed on the monitor screen in the upper right corner next to the time display.

Setting Time & Date

The time is shown in the upper right corner of the screen. Turning the monitor off does not affect the clock.

You can set the monitor clock by adjusting:

* Hours, minutes, and seconds.
* Day, month, and year.
* Clock format of either 12 or 24 hours.



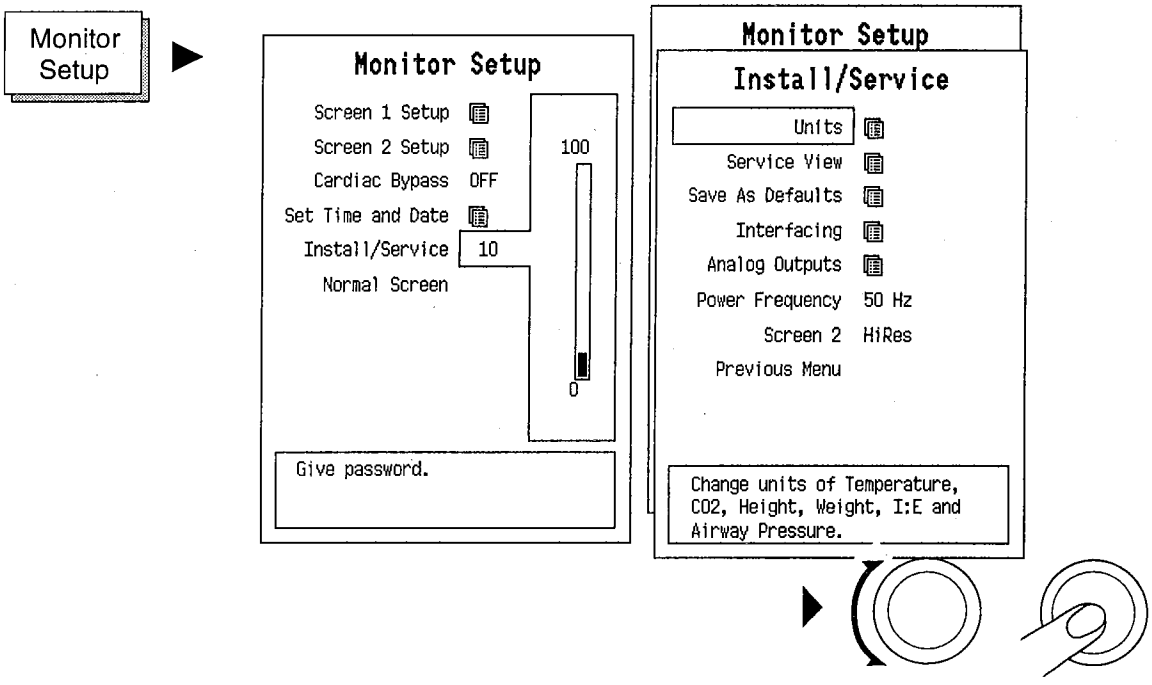
If the monitor is connected to Datex AS/3 Anesthesia Information Centre, the monitor will use the AIC time settings and the above menu is not available.

NOTE: Do not change the monitors time settings during patient monitoring. Patient trend data may be lost.

Install/Service Adjustments

The monitor defaults are configured in the Install/Service sub menu under the Monitor Setup menu. See Installation Manual, Chapter Configuring Factory Defaults, for more information.

To enter Install/Service menu a password "10" must be given.



UNITS

Temperature units can be selected either as °C, or °F. Carbondioxide CO_2 units are either %, kPa or mmHg. CO_2 numbers are adjusted to either dry or wet gases. Height is in either centimeters or inches and weight either in kilograms or pounds. Inspiration expiration rates are expressed either without units, as % or in seconds. Airway pressure Paw is displayed either as kPa, cmH_2O, mmHg or mbar.

SERVICE VIEW

Service View is for a qualified technician only. It is entered with a password.

SAVE AS DEFAULTS

To save permanently your new settings and configurations, these have to be saved as defaults.

The choices are Save All, Screen Setup, Trend Setup, Alarm Settings, Recorder Setup and Param. Defaults.

Select SAVE to save settings, CANCEL to cancel changes, or FACTORY to return the factory settings. See Installation Manual for more information.

INTERFACING — Interfacing setups are for airway gases, SpO_2, NIBP, spirometry and SO_2/C.O. measuring.

ANALOG OUTPUTS — There are eight channels for analog outputs, and they are freely configurable. Select the desired parameter of the displayed list for each channel. The scaling of the analog waveform is displayed in the on-line help box of each selection.

NOTE: These analog outputs are for recording purposes only.

Analog output channels are placed in the UPI board's 44-pin connector (X2):

channel 0	pin 20
channel 1	pin 14
channel 2	pin 19
channel 3	pin 17
channel 4	pin 16
channel 5	pin 10
channel 6	pin 24
channel 7	pin 25
ground	pin 7

POWER FREQUENCY — Selects electrical power frequency of either 50 or 60 Hz. The selection affects the quality of ECG filtering. This is a permanent selection.

SCREEN 2 — Select high or VGA resolution for the secondary screen.

PREVIOUS MENU — Returns to the previous menu level.

Default Settings

The AS/3 Anesthesia Monitor is delivered with certain default settings. These are the so called factory settings. These predefined settings for parameters, alarms, display and other features can be changed by the user.

The predefined settings and their alternative settings are listed in the following tables. The default setting is written within brackets.

When new settings are saved for the monitor it is recommended that these are written down in the empty column of the following tables. If also a different Cardiac Bypass setting is saved these should also be recorded.

Table 5-1 Monitor Settings 1

Monitor Setup		
Parameter	**Default Selection**	**User Default**
Cardiac Bypass	(OFF) ON	
Screen 1 Setup		
Normal Screen	(Waves) Trend	
Show Menus on	Scr1 Scr2 (Scr1&2)	
Show Messages on	Scr1 Scr2 (Scr1&2)	
Screen 1 Setup / Waveform Fields		
Field 1	OFF (ECG1) P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 2	OFF ECG1 (ECG2) P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 3	OFF ECG1 ECG2 ECG3 (P1) P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 4	OFF ECG1 ECG2 ECG3 P1 (P2) P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 5	OFF ECG1 ECG2 ECG3 P1 P2 P3 P4 (PLETH) CO2 O2 AA Paw Flow	
Field 6	OFF ECG1 ECG2 ECG3 P1 P2 P3 P4 PLETH (CO2) O2 AA Paw Flow	
Combine Pressures	(YES) NO	
Screen 1 Setup / Digit Fields		
Lower Field 1	OFF HR ST P1 P2 P3 P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA (Gases) MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Lower Field 2	OFF HR ST P1 P2 P3 P4 PCWP (NIBP) SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Lower Field 3	OFF HR ST P1 P2 P3 P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop (T1+T2) T3+T4 T1 T2 T3 T4 Tblood SO2	

Table 5-2 Monitor Settings 2

Monitor Setup		
Parameter	**Default Selection**	**User Default**
Lower Field 4	OFF HR ST P1 P2 (P3) P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Screen 2 Setup		
Normal Screen	(Waves) Trend	
Show Menus on	Scr1 Scr2 (Scr1&2)	
Show Messages on	Scr1 Scr2 (Scr1&2)	
Screen 2 Setup / Waveform Fields		
Field 1	OFF (ECG1) P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 2	OFF ECG1 (ECG2) P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 3	OFF ECG1 ECG2 ECG3 (P1) P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 4	OFF ECG1 ECG2 ECG3 P1 (P2) P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 5	OFF ECG1 ECG2 ECG3 P1 P2 P3 P4 (PLETH) CO2 O2 AA Paw Flow	
Field 6	OFF ECG1 ECG2 ECG3 P1 P2 P3 P4 PLETH (CO2) O2 AA Paw Flow	
Combine Pressures	(YES) NO	
Screen 2 Setup / Digit Fields		
Lower Field 1	OFF HR ST P1 P2 P3 P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA (Gases) MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Lower Field 2	OFF HR ST P1 P2 P3 P4 PCWP (NIBP) SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	

Table 5-3 Monitor Settings 3

Monitor Setup		
Parameter	**Default Selection**	**User Default**
Lower Field 3	OFF HR ST P1 P2 (P3) P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop (T1+T2) T3+T4 T1 T2 T3 T4 Tblood SO2	
Lower Field 4	OFF HR ST P1 P2 (P3) P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Set Time and Date		
Clock Format	12 (24)	
Install/Service		
Power Frequency	(50 Hz) 60 Hz	
Screen 2	(HiRes) VGA	
Install/Service / Units		
Temperature	(°C) °F	
CO2	(%) kPa mmHg	
CO2 Numbers	(Dry) Wet	
Height	(cm) in	
Weight	(kg) lb	
I:E	(-) % sec	
Paw	kPa (cmH2O) mmHg mbar	
Install/Service / Service View / Monitor		
Language	Selection depends on the software cassette adaption.	
Install/Service / Interfacing		
Gases	(Module) AGM CNO-103 CD-200 CD2-O2 SC SCO ULT ULT/al CC/CG	
SpO2	(Module) M-NSAT ULT ULT/al CC/CG SC SCO OS-123 OSE-123 OSP-200 N-100 N-200	

Table 5-4 Monitor Settings 4

Monitor Setup		
Parameter	**Default Selection**	**User Default**
NIBP	(Module) 1846SX	
Spirometry	(Module) ULT	
SO2/C.O.	(None) Oxim.3	
Install/Service / Analog Outputs		
Channel 0	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 1	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 2	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 3	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 4	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 5	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	

Table 5-5 Monitor Settings 5

Monitor Setup		
Parameter	**Default Selection**	**User Default**
Channel 6	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 7	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	

Table 5-6 ECG Settings

ECG		
Parameter	**Default Selection**	**User Default**
ECG1 Lead		
3 Lead Cable	I (II) III	
5 Lead Cable	I (II) III aVR aVL aVF V	
ECG2 Lead		
3 Lead Cable	Casc	
5 Lead Cable	I II III aVR aVL aVF (V) Casc	
ECG3 Lead		
3 Lead Cable	Casc	
5 Lead Cable	I II III (aVR) aVL aVF V Casc	
Size	(1) 0.2-5.0	
Beat Sound Volume	(3) 0-10	
ECG Setup		
Sweep Speed	12.5 (25) 50	
HR Source	(AUTO) ECG Pleth	
Filter	(Monit) Diagn STfilt	
ECG Cable Type	(3 lead) 5 lead	
Grid	ON (OFF)	
Pacemaker	Show (Hide) ON R	
Colour	Yellow White (Green) Red Blue	
QRS Type	(Normal) Wide	N.A.

Table 5-7 Pulse Oximetry Settings

Pulse Oximetry		
Parameter	**Default Selection**	**User Default**
Beat Sound Volume	(3) 0-10	
Scale	AUTO 50 (20) 10 5 2	
SpO2/Pleth Setup		
Sweep Speed	12.5 (25) 50	
HR Source	(AUTO) ECG Pleth	
SpO2 Response	B-to-B Normal (Slow)	
Colour	(Yellow) White Green Red Blue	

Table 5-8 Pressure Settings 1

Invasive Pressures		
Parameter	**Default Selection**	**User Default**
P1 Setup		
Label	(P1) Art CVP PA RAP RVP LAP ICP ABP	
Scale	(200) 0-300	
Colour	Yellow White Green (Red) Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(22) 4-22	
P2 Setup		
Label	(P2) Art CVP PA RAP RVP LAP ICP ABP	
Scale	(20) 0-300	
Colour	Yellow White Green Red (Blue)	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
P3 Setup		
Label	(P3) Art CVP PA RAP RVP LAP ICP ABP	
Scale	(20) 0-300	
Colour	Yellow White Green Red (Blue)	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	

Table 5-9 Pressure Settings 2

Invasive Pressures		
Parameter	**Default Selection**	**User Default**
P4 Setup		
Label	(P4) Art CVP PA RAP RVP LAP ICP ABP	
Scale	(60) 0-300	
Colour	(Yellow) White Green Red Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
Art Setup		
Label	P4 (Art) CVP PA RAP RVP LAP ICP ABP	
Scale	(200) 0-300	
Colour	Yellow White Green (Red) Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(22) 4-22	
CVP Setup		
Label	P4 Art (CVP) PA RAP RVP LAP ICP ABP	
Scale	(20) 0-300	
Colour	Yellow White Green Red (Blue)	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	

Table 5-10 Pressure Settings 3

Invasive Pressures		
Parameter	**Default Selection**	**User Default**
PA Setup		
Label	P4 Art CVP (PA) RAP RVP LAP ICP ABP	
Scale	(60) 0-300	
Colour	(Yellow) White Green Red Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
RAP Setup		
Label	P4 Art CVP PA (RAP) RVP LAP ICP ABP	
Scale	(20) 0-300	
Colour	Yellow (White) Green Red Blue	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
RVP Setup		
Label	P4 Art CVP PA RAP (RVP) LAP ICP ABP	
Scale	(60) 0-300	
Colour	Yellow (White) Green Red Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	

Table 5-11 Pressure Settings 4

Invasive Pressures		
Parameter	**Default Selection**	**User Default**
LAP Setup		
Label	P4 Art CVP PA RAP RVP (LAP) ICP ABP	
Scale	(20) 0-300	
Colour	Yellow (White) Green Red Blue	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
ICP Setup		
Label	P4 Art CVP PA RAP RVP LAP (ICP) ABP	
Scale	(20) 0-300	
Colour	Yellow (White) Green Red Blue	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
ABP Setup		
Label	P4 Art CVP PA RAP RVP LAP ICP (ABP)	
Scale	(200) 0-300	
Colour	Yellow White Green (Red) Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(22) 4-22	

Table 5-12 NIBP Settings

NIBP		
Parameter	**Default Selection**	**User Default**
Set Cycle Time	1 2.5 3 (5) 10 15 30 60	
NIBP Setup		
Ready Prompt	(5) 0-10	
Inflation Limits	(AUTO) Infant Child Adult	
Colour	Yellow White Green (Red) Blue	

Table 5-13 Other Parameter Settings

Others		
Parameter	**Default Selection**	**User Default**
C.O. View / C.O. Setup		
Scale	0.5 (1.0) 2.0	
Catheter Type	(1) 2 3 4 5 User	
Injectate Volume	3 5 (10)	
Measurement Mode	Single (Set)	
Colour	Yellow (White) Green Red Blue	
C.O. View / Haemo Calcs / Oxygen Calcs / Calcs Units		
FiO2	(%) None	
Blood Gases	kPa (mmHg)	
Hgb	(g/l) g/dl mmol/l	
O2 Contents	(ml/l) ml/dl	
ATMP	kPa (mmHg) mbar	
Temp Setup		
Unit	(°C) °F	
T1 Label	(T1) Eso Naso Tymp Rect Blad Axil Skin AirW Room Myo Surf	
T2 Label	(T2) Eso Naso Tymp Rect Blad Axil Skin AirW Room Myo Surf	
T3 Label	(T3) Eso Naso Tymp Rect Blad Axil Skin AirW Room Myo Surf	
T4 Label	(T4) Eso Naso Tymp Rect Blad Axil Skin AirW Room Myo Surf	
Display Tblood	YES (NO)	
Colour	Yellow (White) Green Red Blue	

Table 5-14 Airway Gas Settings 1

Airway Gas		
Parameter	**Default Selection**	**User Default**
Select Agent	(AUTO) None Hal Enf Iso Des Sev	
Spirometry View / Scaling		
Vol Scale	(AUTO) 300 600 900 1200 1800 2400	
Scaling Speed	(Slow) Fast	
CO2 Setup		
Scale	(6%) 10% 15%	
Unit	(%) kPa mmHg	
Colour	Yellow (White) Green Red Blue	
Sweep Speed	(Fast) Slow	
Rebreathing Alarm	OFF 1% 2% (3%)	
O2 Setup		
Scale	(DIFF6) DIFF10 DIFF15 DIFF30 10-60% 100%	
Measurement	(ON) OFF	
Colour	Yellow (White) Green Red Blue	
Sweep Speed	(Fast) Slow	
Agent Setup		
Scale	1.2% (2.5%) 5% 10% 20%	
Select Agent	(AUTO) None Hal Enf Iso Des Sev	
Measurement	(ON) OFF	
Colour		
Halothane	Yellow White Green (Red) Orange Blue Violet	
Enflurane	Yellow White Green Red (Orange) Blue Violet	
Isoflurane	Yellow White Green Red Orange Blue (Violet)	
Desflurane	Yellow White Green Red Orange (Blue) Violet	
Sevoflurane	(Yellow) White Green Red Orange Blue Violet	

Table 5-15 Airway Gas Settings 2

Airway Gas		
Parameter	**Default Selection**	**User Default**
Sweep Speed	(Fast) Slow	
N2O Setup		
Colour	Yellow White Green Red (Blue)	
Measurement	(ON) OFF	
Paw Setup		
Paw Scale	(Loop) 10 20 30 40 60 80	
Colour	(Yellow) White Green Red Blue	
Sweep Speed	(Fast) Slow	
Sensor Type	(Adult) Paedi	
Flow & Vol Setup		
Flow Scale	(Loop) 15 30 45 60 90 120	
Colour	Yellow White (Green) Red Blue	
Sweep Speed	(Fast) Slow	
Sensor Type	(Adult) Paedi	
TV or MV	(TV) MV	
TV Based on	ATPD NTPD (BTPS) STPD	

Table 5-16 Recorder Settings

Recorder		
Parameter	**Default Selection**	**User Default**
Waveform 1	OFF (ECG1) ECG2 ECG3 P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Waveform 2	(OFF) ECG1 ECG2 ECG3 P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Waveform 3	(OFF) ECG1 ECG2 ECG3 P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Trend Type	(Num) Graph Tab	
Graphic Trend 1	ST (HR) P1 P2 P3 P4 NIBP SpO2 Pleth CO2 O2 N2O AA Resp T1+T2 T3+T4 Tblood PEEP Ppeak Compl MV SO2	
Graphic Trend 1	ST HR (P1) P2 P3 P4 NIBP SpO2 Pleth CO2 O2 N2O AA Resp T1+T2 T3+T4 Tblood PEEP Ppeak Compl MV SO2	
Recorder Setup		
Start on Alarms	YES (NO)	
Waveform Delay	(12 s) OFF	
Trend Resolution	1 (5) 10 30	
Paper Speed	1 6.25 12.5 (25)	
Recording Length	(20 s) Cont	

Table 5-17 Trend Settings 1

Display Trends		
Parameter	**Default Selection**	**User Default**
Print Graph / Printer Setup		
Trend Page 1	(ON) OFF	
Trend Page 2	ON (OFF)	
Trend Page 3	ON (OFF)	
Trend Page 4	ON (OFF)	
Trend Page 5	ON (OFF)	
Trend Page 6	ON (OFF)	
Paper Size	(A4) Letter	
Trend Setup / Trend Page 1		
Field 1	OFF (ECG1) HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(HR+Sp)	
Field 3	(P1+P2)	
Field 4	(O2+N2O)	
Field 5	(CO2+AA)	
Field 6	(OFF)	
Trend Setup / Trend Page 2		
Field 1	OFF (ECG1) HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(P3+P4)	
Field 3	(ST)	
Field 4	(T1+T2)	
Field 5	(Tblood)	
Field 6	(OFF)	

Table 5-18 Trend Settings 2

Display Trends		
Parameter	**Default Selection**	**User Default**
Trend Setup / Trend Page 3		
Field 1	OFF (ECG1) HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(Sp+Ple)	
Field 3	(Airway)	
Field 4	(MVexp)	
Field 5	(Compl)	
Field 6	(OFF)	
Trend Setup / Trend Page 4		
Field 1	(OFF) ECG1 HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(OFF)	
Field 3	(OFF)	
Field 4	(OFF)	
Field 5	(OFF)	
Field 6	(OFF)	
Trend Setup / Trend Page 5		
Field 1	(OFF) ECG1 HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(OFF)	
Field 3	(OFF)	
Field 4	(OFF)	

Table 5-19 Trend Settings 3

Display Trends		
Parameter	**Default Selection**	**User Default**
Field 5	(OFF)	
Field 6	(OFF)	
Trend Setup / Trend Page 6		
Field 1	OFF (ECG1) HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(OFF)	
Field 3	(OFF)	
Field 4	(OFF)	
Field 5	(OFF)	
Field 6	(OFF)	

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6 TRENDS

The monitor accumulates and displays trend data for user selected periods between 2 and 24 hours.

There are two types of trend screens available. The graphical trend displays trend data in a graphical format for each parameter monitored. There are six graphical trend pages. Each trend page is user configurable.

The second trend format is the numerical trend. In this format, the trend data is displayed in tabular form. Five pages are reserved for numerical trend data.

In addition a 10-minute trend is displayed in the Alarm Setup menu for every parameter with limit alarms. In ST view a trend is displayed for ST values for every measured ECG lead.

The monitor can also be configured to display trends as normal screen instead of the standard waveforms. When two screens are used it may be practical to display waveforms on one screen and trends on the other screen.

During trend display the monitor is active and the numerical information is continuously updated and displayed. Trend data is stored in memory for 15 minutes after the monitor is turned off.

The following variables are trended:

Electrocardiography (HR, ST)
Invasive pressure
Cardiac Output
Non invasive blood pressure
Oxygen saturation (pleth, SpO_2)
Gases (CO_2, O_2, N_2O, AA, MAC, resp)
Temperatures
Airway pressure
Airway flow
Derived values from airway pressure and flow
SvO_2 (from interfaced monitors)

Viewing Graphical Trend Pages

Each trend page can have up to six trend fields. The first field may be reserved for real-time ECG.

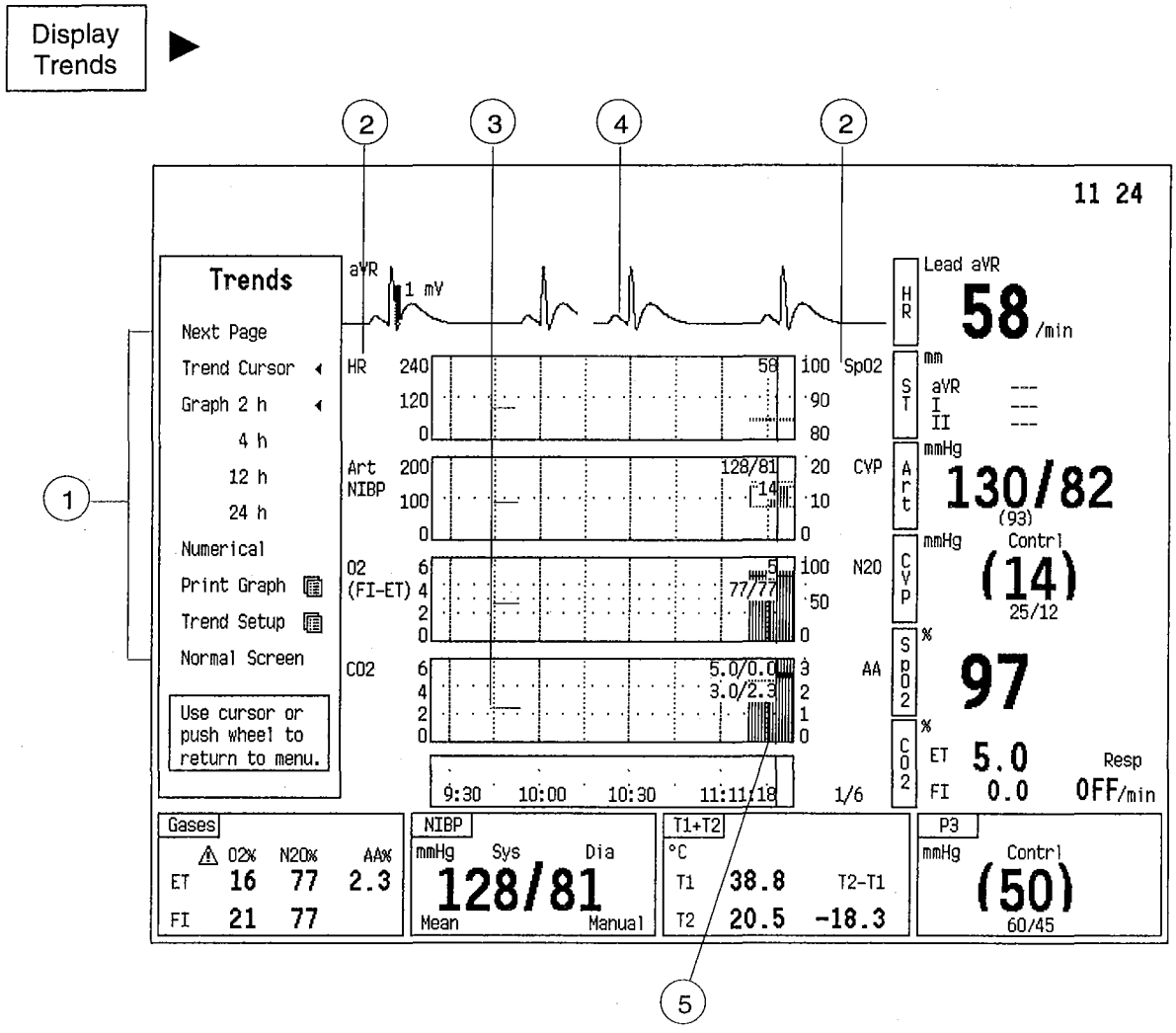


Figure 6-1 First Graphical Trend Page

(1) List of selections
(2) Labels
(3) Parameter trend fields
(4) Real time ECG1 above the trend information
(5) Movable trend cursor

Pages are turned by selecting NEXT TREND. The last accessed page is saved in memory. When entering the Display trends menu again, it appears first.

First page:

real time ECG1
HR + SpO_2
P1 + P2 + NIBP
O_2 + N_2O
CO_2 + AA
OFF

Second page:

Real time ECG1
P3 + P4
ST
T1 + T2
Tblood
OFF

Third page

Real time ECG1
SpO_2 + pleth
Pplat/PEEP + Ppeak
MVexp
Compliance
OFF

Pages four, five and six

Not used in stand-alone monitors when delivered from the factory.

The graphical trend pages can be configured by the user and these settings will always be displayed if saved as defaults.

NOTE: When the monitor is connected to a Datex AS/3 Anesthesia Network, the monitor will always start with the trend settings defined in the Datex AS/3 Anesthesia Information Center.

Viewing Numerical Trend Pages

You may view trend data also in a numerical trend format. The trend information is updated every five minutes and always after NIBP measurement. The latest information is displayed at the bottom of the page. If the MARK EVENT key has been pressed new lines of values marked with the numbers are displayed.

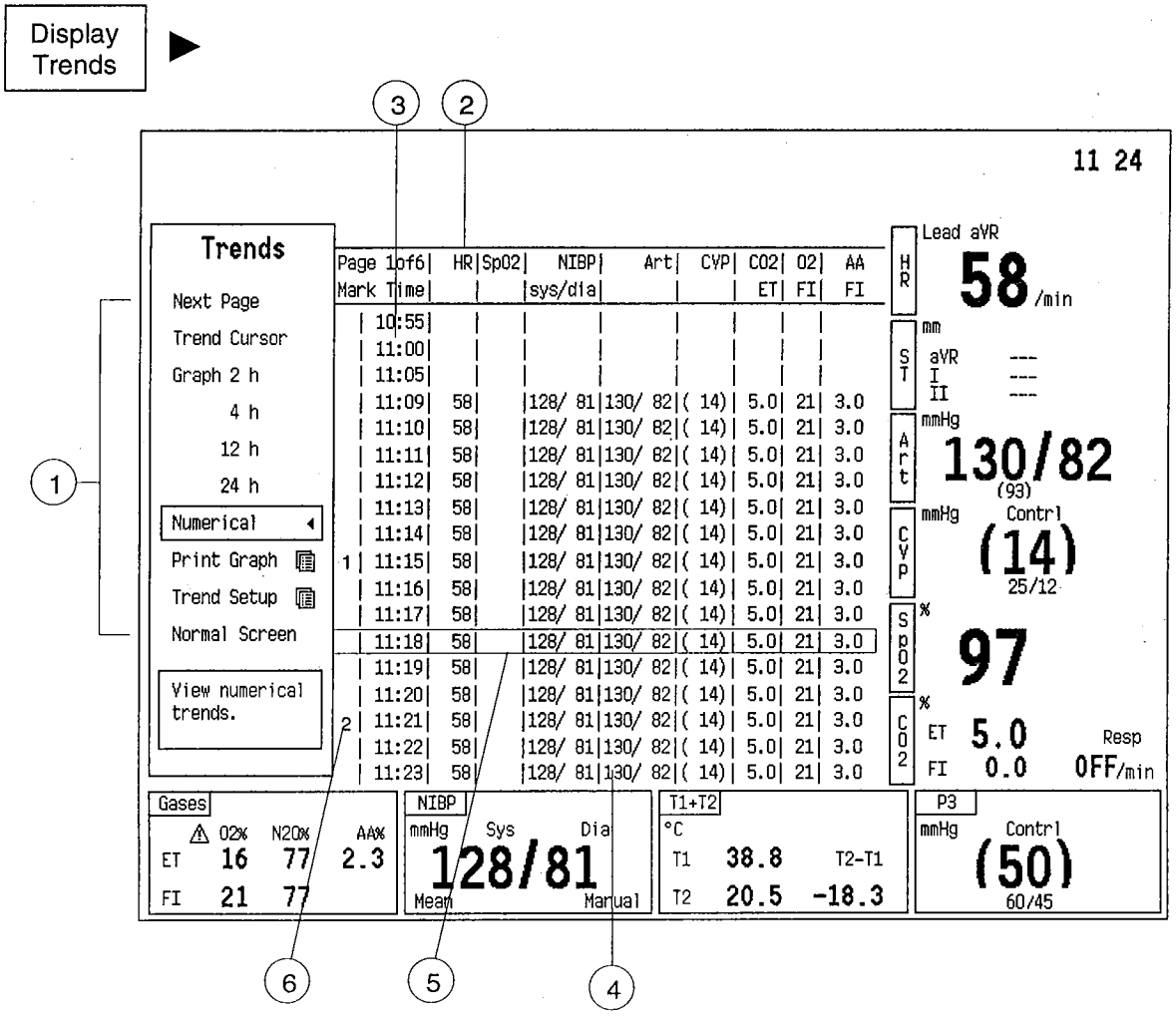


Figure 6-2 Numeric Trend Page

(1) List of selections
(2) Labels
(3) Time of measurement
(4) Numeric trend information
(5) Movable cursor
(6) Marked lines

The trend information is displayed on four pages

Pages are turned by selecting NEXT PAGE.

The last accessed page is saved in the memory. When entering the Display Trends menu again, it appears first.

Below are listed the parameters for each trend page with the default parameter within brackets.

1) Vital parameters

HR, SpO_2, NIBP (sys/dia), Art (sys/dia), CVP (mean), CO_2 (ET), O_2 (Fi), AA (Fi)

2) Hemodynamic parameters

P1 (Art), P2 (CVP), P3, P4 (PA), T1, T2

3) Gas parameters

CO_2 (ET/FI), O_2 (ET/FI) , N_2O (ET/FI), AA (ET/FI), MAC, RR,

4) Airway pressure and flow parameters

Ppeak, Pplat, PEEP, Compl, MV (Exp), TV (Exp), RR

5) Temperatures and saturations

T1, T2, T3, T4, Tblood, SpO_2, SO_2

Using Trend Cursor

The trend cursor can be used for displaying the exact numeric value of a certain point on the graphical trend.

* Select Trend Cursor on the Trends menu

* Move the cursor to the desired point by turning the Com-Wheel. The time is shown under the trend boxes.

* If there is data in the memory measured earlier than the selected trend length shows, the displayed trend window moves to the left by moving the cursor to the left.

Numeric values are displayed on the left side of the cursor. The values are always in 1 minute resolution, even with 24 h trends.

* Return to the menu by pushing the ComWheel

Selecting Trend Length

You may graphically display trend data for the following trending period:

Table 6-1 Trend Resolutions

PERIOD (hours)	RESOLUTIO ON DISPLAY (minutes)
2	1
4	2
12	6
24	12

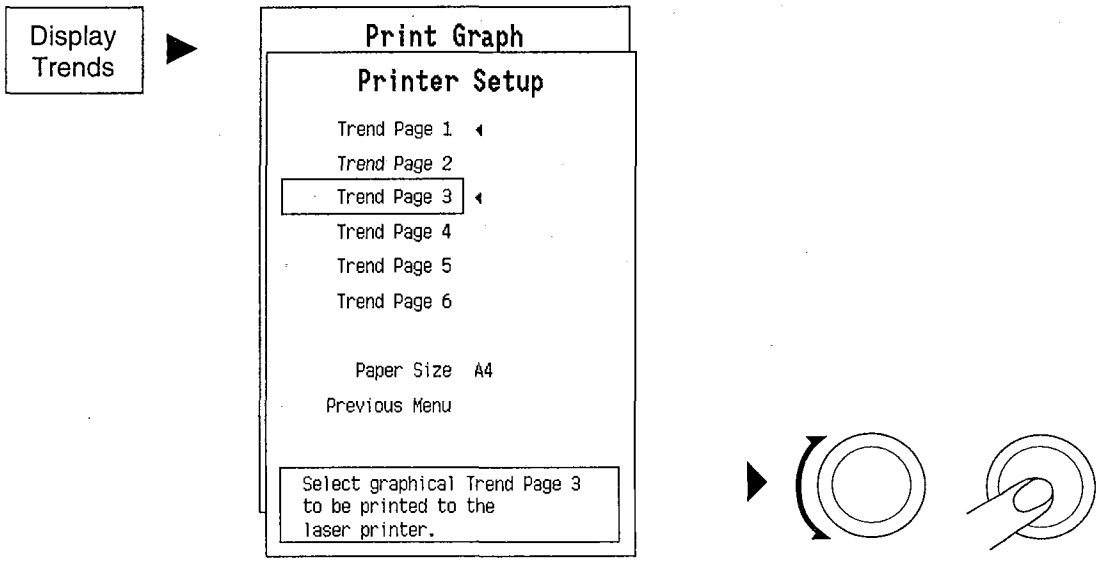
Printing Trends

Trends can be printed either with Recorder Module M-REC or with a laser printer.

The recorder can print an independently configured set of parameters as numerical, graphical, and tabular trends. For more information, see chapter 9 Printing.

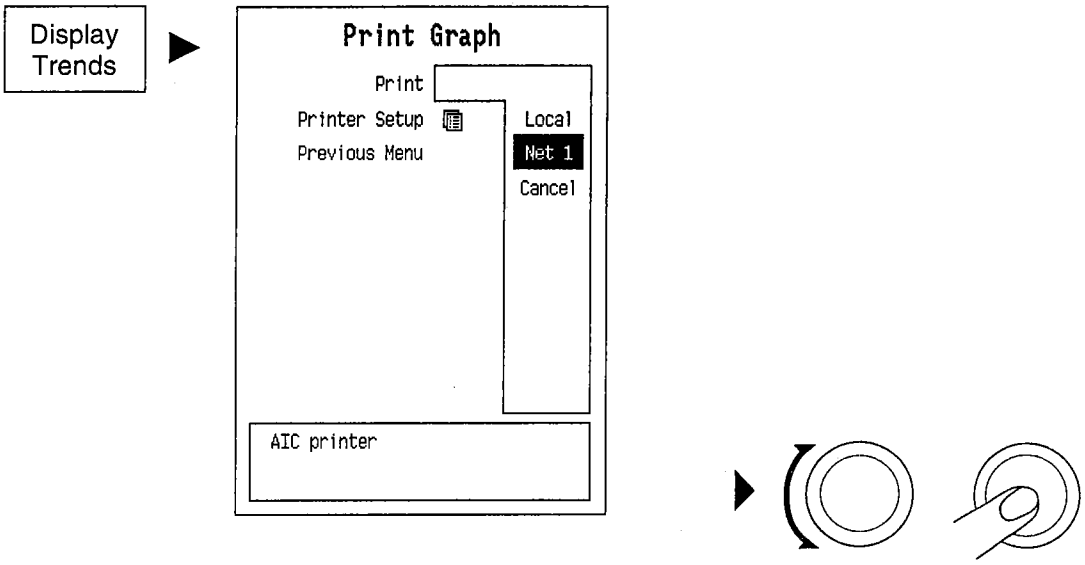
With a laser printer you can print the graphical trend pages of the monitor trends. For laser printing you don't need to separately define the printed parameter trends, only to select which pages you want printed.

To select the trends to be printed, select Printer Setup and highlight the desired trend page and push the ComWheel. A small arrow is displayed next to the selected trend pages.



To print the trends:

* Push the Trends key and select Print Graph.

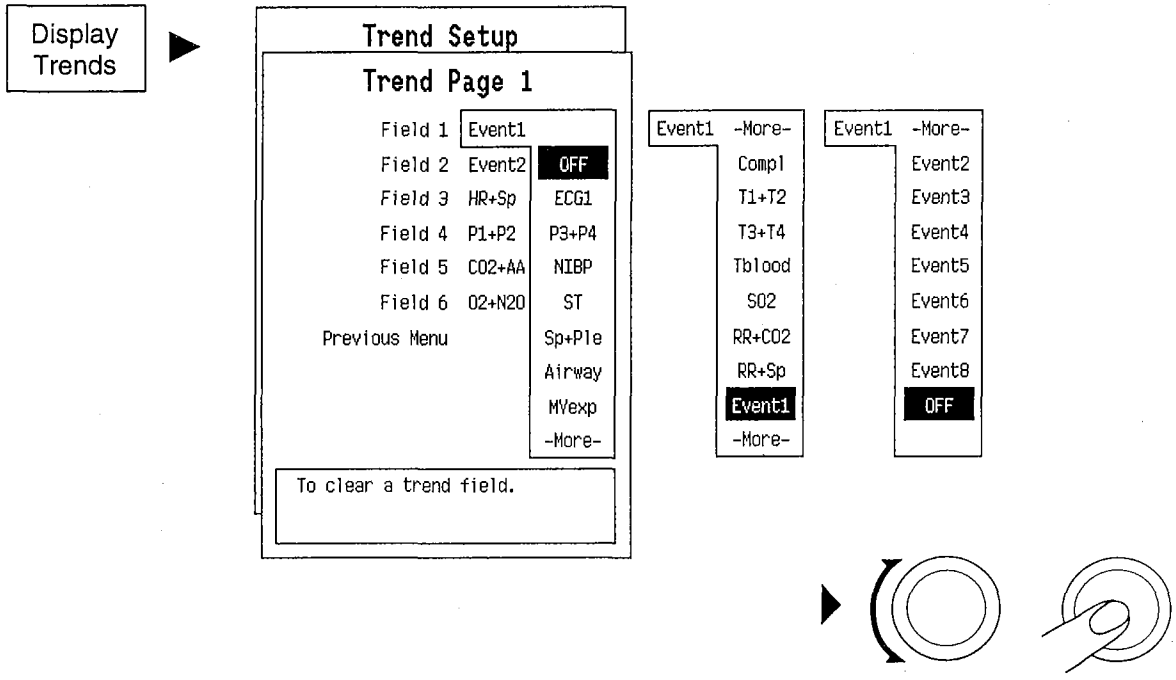


The first Trend Page to be printed, is labelled P1. The next Trend Page is subsequently labelled P2. A trend page may include several sheets of paper and their order can be determined from the trend time.

Trend Setup

Each trend page can be set up from a list of possible parameters.

* Select Trend Setup
* Select the trend page you want to change.
* Select one parameter for each field of the trend page or select OFF.

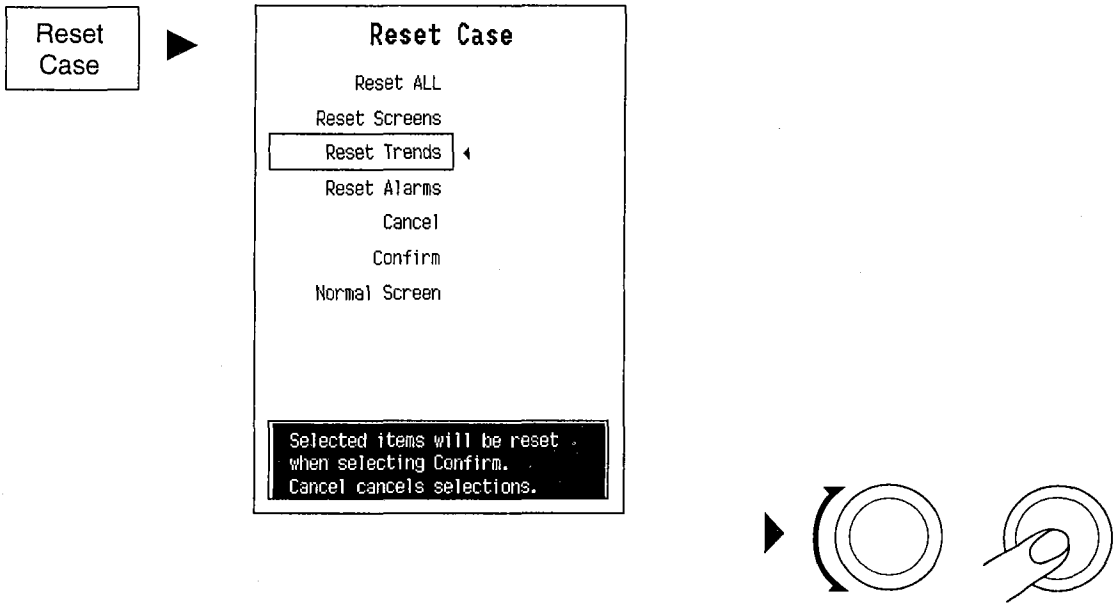


If your AS/3 Anesthesia Monitor includes record keeping, event options are also included. One trend page should be configured to become the anesthesia record.

If you want to have the same trend setup permanently you should save the new user default settings. For a complete list of trend page options see chapter Monitor Setup part Default Settings.

Erasing Trend Data

Trend data can be erased by pressing the RESET CASE key and selecting Reset Trends. After the selection is made a mark appears on the right side of the selection. Select Confirm to confirm the selection. On-line help displays the reset features. Selecting Cancel brings back the reset settings, if you have not already exited the menu.



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7 PATIENT DATA & CALCULATIONS

Overview

The AS/3 Anesthesia Monitor continuously collects and saves patient data such as trends. In addition the user can include additional information to achieve a more complete patient chart.

The possibilities depend on the capabilities of your AS/3 System.

With a single, stand-alone AS/3 Anesthesia Monitor you can add patient demographics, perform hemodynamic and oxygenation calculations and you can place event markers to the trends. All this information can be printed or can be saved to a Datex AS/3 MemCard, Data.

When the patient is transferred from the operating room to the recovery room, the Data card is also transferred and thus the recovery room receives all previously collected information immediately and new information is added to the same patient file.

The AS/3 Anesthesia Record Keeper is your tool for making a complete anesthesia record. With a AS/3 Anesthesia Record Keeper you can include also drug information, fluid information and written comments of any events during patient monitoring. Written comments can include for example laboratory results.

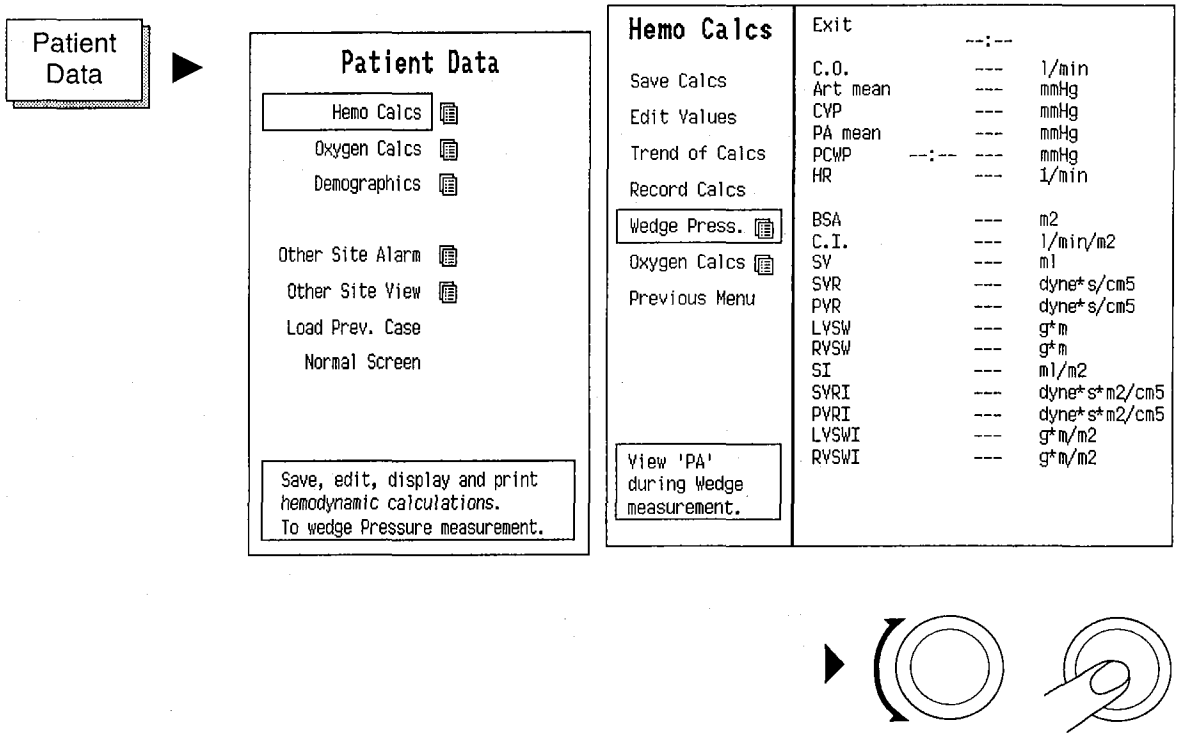
When your AS/3 Anesthesia Monitor is connected to the Datex AS/3 Anesthesia Network the patient information is saved to a network computer and information transfer does not require a Data card. In addition the network offers the possibility to view the real time patient information from another monitoring site.

Hemodynamic Calculations

All the measured cardiac parameters can be displayed and edited, and also parameters measured by other means can be entered to the list of cardiac parameters:

* Push the Patient Data key. Alternatively push the Start C.O. key on the module.

* Select Hemo Calcs



* Enter or edit input parameters (e.g. measured by other monitors). Edited values are marked by an asterisk.

* Save calculated and entered values by selecting SAVE CALCS. in the Hemo Calc menu.

If calculations are not saved before a new C.O. measurement is made, they will be lost. Up to six sets of calculations can be saved. They can be displayed by selecting TREND OF CALCS in the Hemo Calc menu.

NOTE: To display index values weight and height must be given before measurement, see PATIENT DATA later in this chapter.

List of cardiac input parameters (= parameters measured by the monitor, or entered manually from the other measurements):

Invasive pressures are stored at the time of confirming the C.O. value.

C.O.	cardiac output, l/min
HR	heart rate, beats/min
PCWP	pulmonary capillary wedge pressure, mmHg
CVP mean	mean central venous pressure, mmHg
PA mean	mean pulmonary artery pressure, mmHg
Art mean	mean arterial pressure, mmHg

List of calculated cardiac parameters:

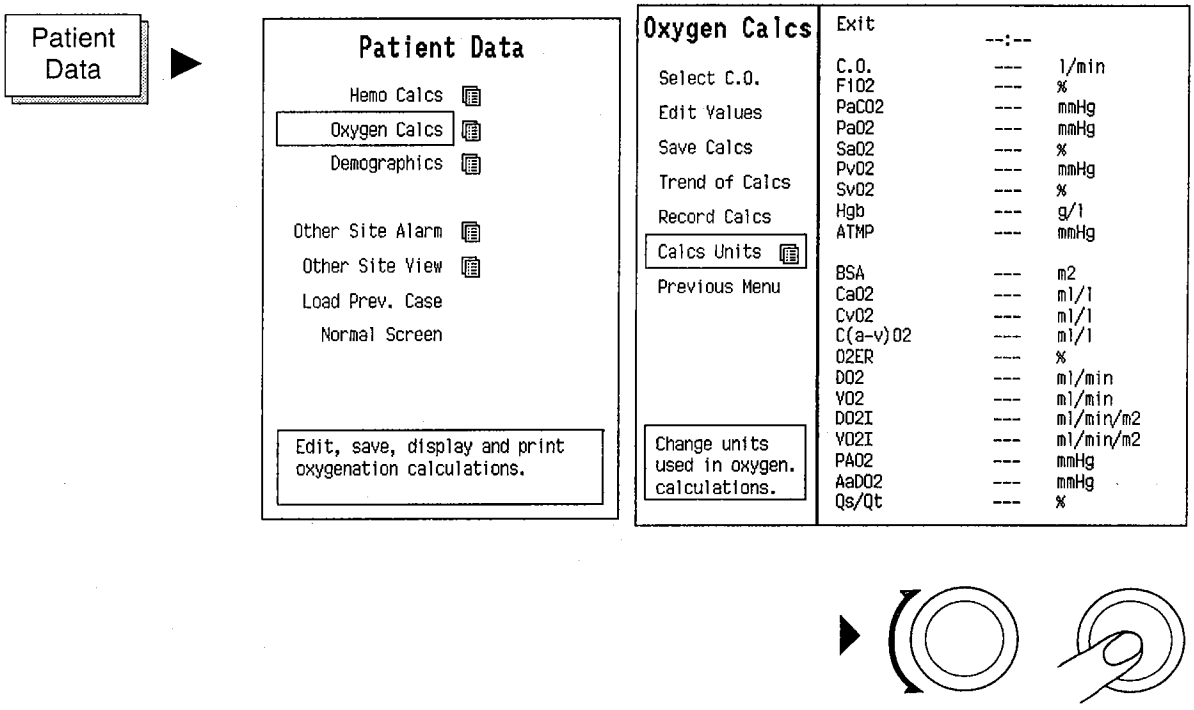
C.I.	cardiac index, l/min/m^2
SV	stroke volume, ml/beat
SI	stroke volume index, ml/beat/m^2
SVR	systemic vascular resistance, dynes-sec/cm^5
SVRI	systemic vascular resistance index, dynes x sec x m^2/cm^5
PVR	pulmonary vascular resistance, dynes-sec/cm^5
PVRI	pulmonary vascular resistance index, dynes x sec x m^2/cm^5
LVSW	left ventricular stroke work, gram-meters
LVSWI	left ventricular stroke work index, gram-meters/m^2
RVSW	right ventricular stroke work, gram-meters
RVSWI	right ventricular stroke work index, gram-meters/m^2

The pulmonary capillary wedge pressure (PCWP) measurement can be started by choosing WEDGE PRESSURE in the Hemo Calc menu or with START WEDGE key in the module. See Chapter Invasive Pressure for further instructions.

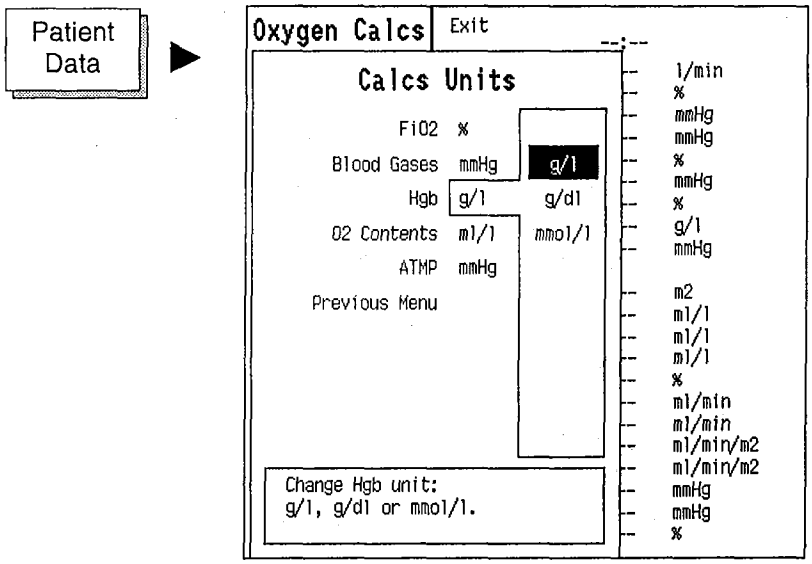
Oxygen Calculations

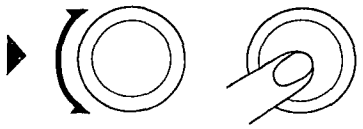
To access oxygen calculations:

* Push the PATIENT DATA key
* Select Oxygen Calcs.



* Select the correct calculation units.





The Data is arranged so that parameters automatically measured by the monitor and those manually entered are listed first and calculated parameters come last. When measured or manually entered values are changed this is indicated next to the value.

When a specific value is not entered manually, the monitor uses a value from the previous calculation as a default value. For the first calculation nominal values are used.

C.O. cardiac output

FiO_2 fraction of inspired oxygen 1..100 % (0.01..1.00)

$PaCO_2$ arterial carbon dioxide level 10..101 mmHg (1.3..13.5 kPa)

PaO_2 arterial oxygen level 10..496 mmHg 1.3..66 kPa)

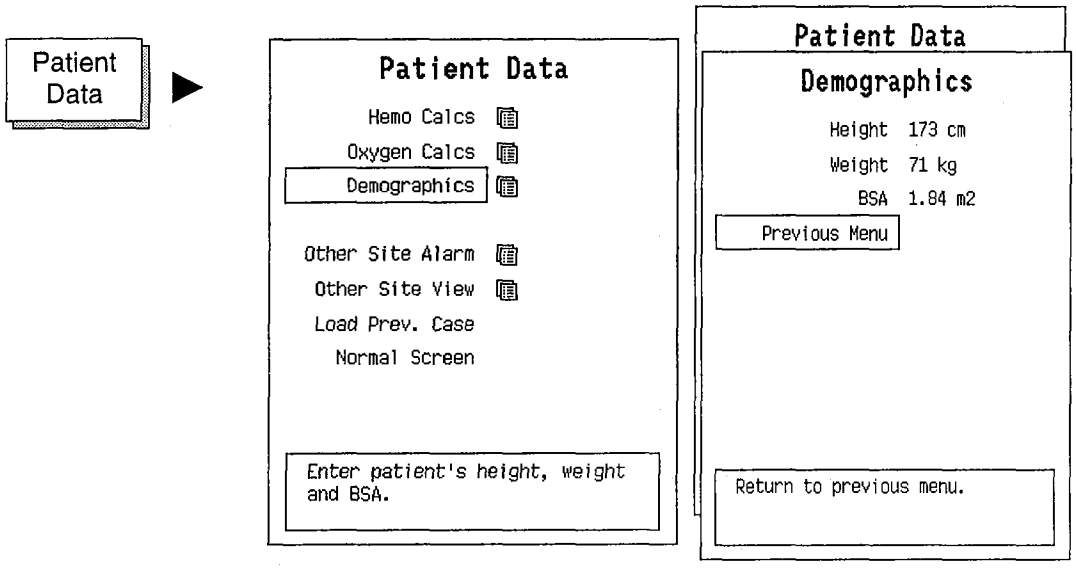
SaO_2 arterial oxygen saturation 10..100 %

CaO_2 arterial oxygen content ml/l (ml/100ml)
$= (1.34 * Hgb * SaO_2/100) + (PaO_2 * 0.031)$ ml/l

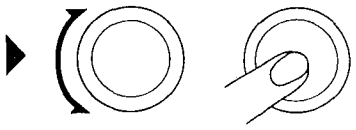
PvO_2	venous oxygen level 10..101 mmHg (1.3..13.5 kPa)
SvO_2	venous oxygen saturation 10..100 %
CvO_2	venous oxygen content ml/l (ml/100ml) = (1.34 * HB * SvO_2/100) + (PvO_2 * 0.031) ml/l
Hgb	hemoglobin 50..200 g/l (5..20 g/100ml or 7.42..11.15 mmol/l)
ATMP	atmospheric pressure 760 mmHg (101.3 kPa or 1013 mbar)
$C(a\text{-}v)O_2$	arteriovenous oxygen content difference ml/l (ml/100ml)
O_2ER	oxygen extraction ratio % = O_2EXT = $C(a\text{-}v)O_2/CaO_2$ * 100 % = (CaO_2-CvO2)/CaO_2 * 100 %
DO_2	oxygen transport ml/min = C.O.*CaO_2 ml/min
DO_2I	oxygen transport index ml/min/m2 O_2TRAI = C.I.*CaO_2
VO_2	oxygen consumption ml/min = $C(a\text{-}v)O_2$ * C.O.
VO_2I	oxygen consumption index ml/min/m2 = $C(a\text{-}v)O_2$ * C.I.
PAO_2	alveolar oxygen level mmHg (kPa) = FiO_2/100*(ATMP-47)-$PaCO_2$*(FiO_2/100+(1-FiO_2/100)/RQ)
$AaDO_2$	alveolo-arterial oxygen difference mmHg (kPa) PAO_2-PaO_2 mmHg
Qs/Qt	venous admixture % = 100*Hgb*1.34*(1-(SaO_2/100))+0.031*(PAO_2-PaO_2)/Hgb*1.34*(1-(SvO_2/100))+0.031*(PAO_2-PvO_2)

Patient Demographics

* Push the PATIENT DATA key on the Command Board
* Select DEMOGRAPHICS.



HEIGHT — Adjustable from 15 cm to 250 cm.



WEIGHT — Adjustable from 1 kg to 250 kg.

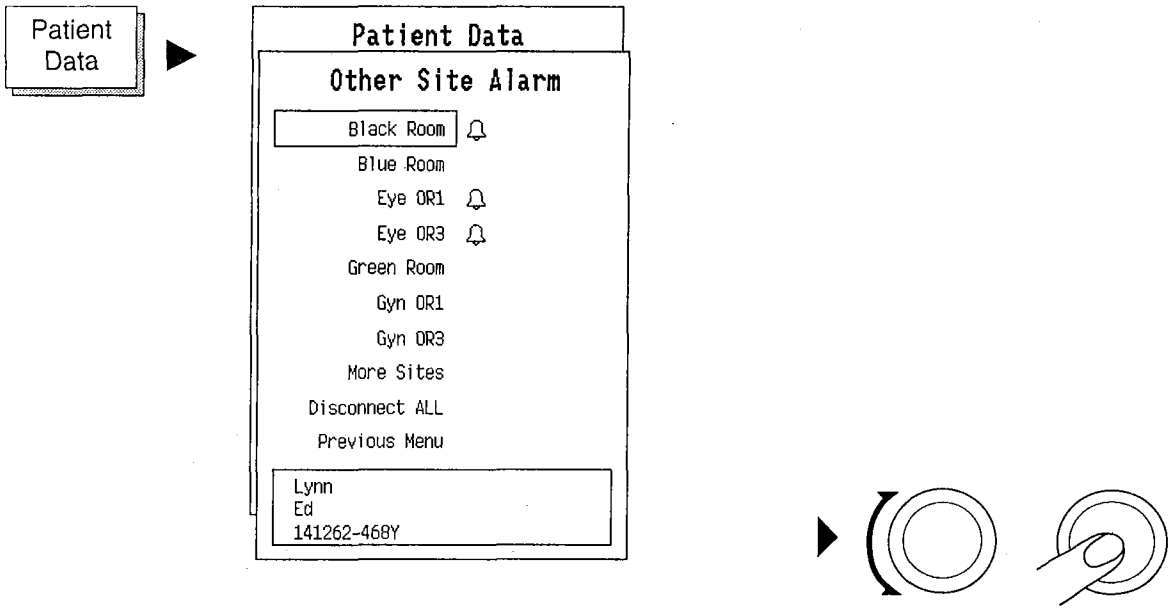
BSA — The body surface area is calculated automatically by using du Bois formula. The body surface area is used in calculating index values of some parameters, see Chapter CARDIAC OUTPUT

NOTE: If a Datex AS/3 Anesthesia Record Keeper is connected, then the record keeper Patient menu is displayed.

Other Site Alarm

From a networked AS/3 monitor the alarms can be viewed from other AS/3 monitors or an AS/3 Anesthesia Information Centre.

* Push the Patient Data key
* Select Other Site Alarm



The other sites from where the alarms are forwarded to your monitor are marked by a bell next to the site name.

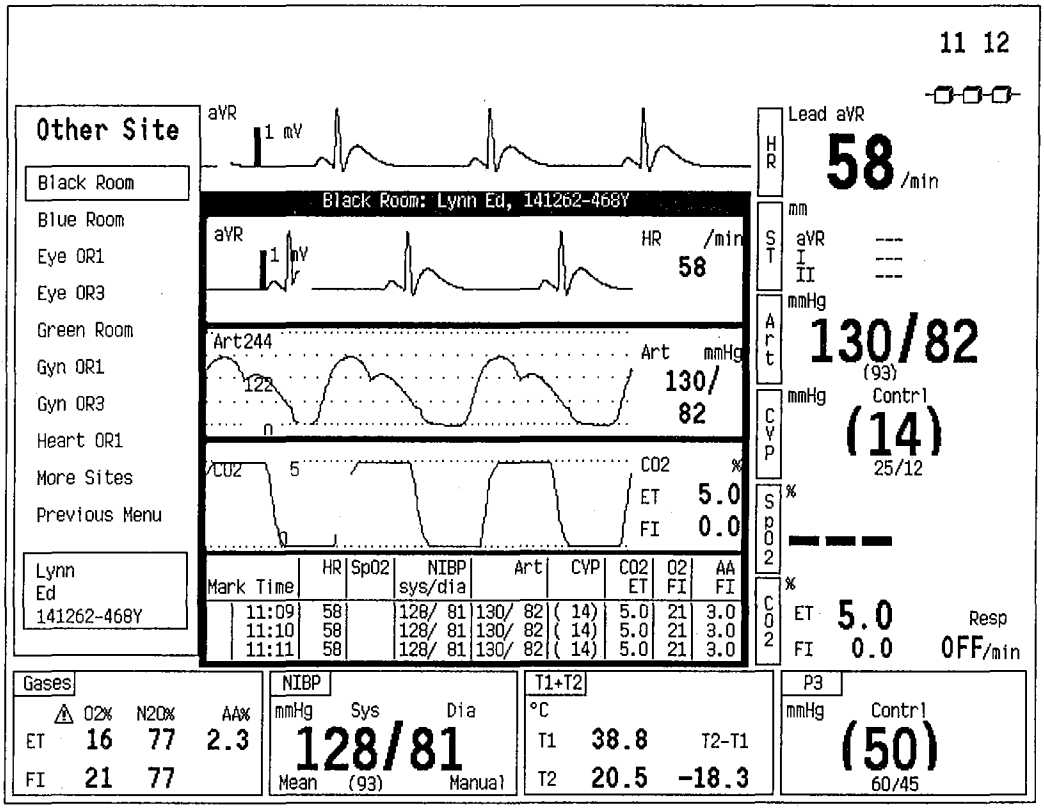
To select or unselect a site, highlight the name and push the Com-Wheel.

Other Site View

From your AS/3 monitor you can see the numerics and waveforms of another AS/3 monitor if both monitors are connected to the AS/3 Anesthesia Network.

* Push the Patient Data key
* Select Other Site View
* Select which site you want to view

Patient Data ▶

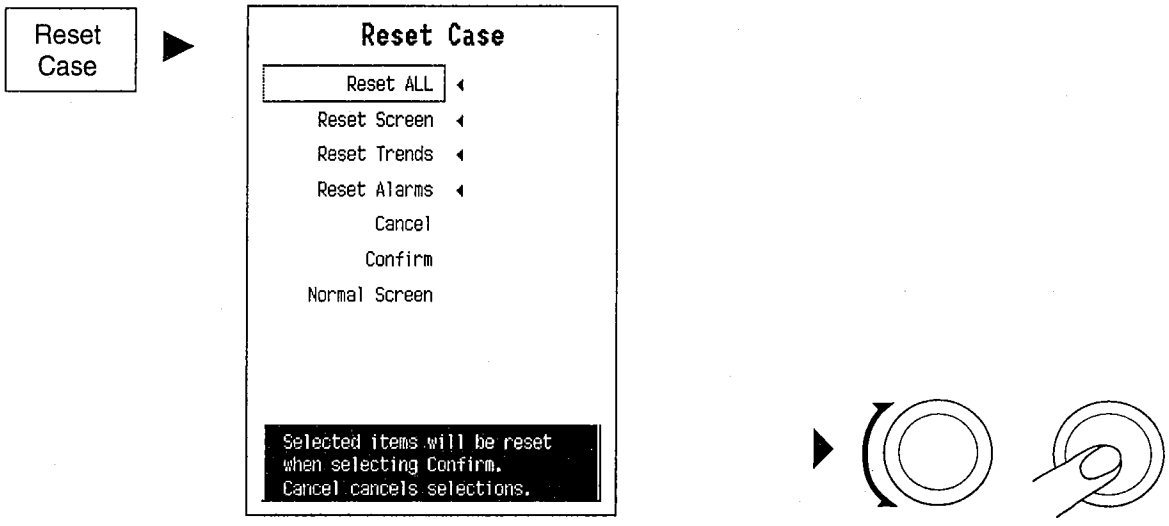


Load Previous Case

The Load previous case command is used when a patient monitoring has already been ended but will for some unexpected reason have to be continued. Information is retrievable within 15 minutes from turning the monitor to standby.

Reset Case

At the beginning of a new procedure, it is desirable to erase or reset the screen layout, trend data, alarm and parameter settings that were used during the previous case. Push the RESET CASE key.



It is possible to reset either all at the same time or to reset the screen layout, trend data or alarms separately. Select Confirm after you have selected what to reset. On-line help displays the reset features. Selecting Cancel brings back the reset settings, if you have not already exited the menu.

Mark Event

Pressing the MARK/EVENT key numbers the events from 1 to 99. After pressing the key MARK xx is displayed on the message field, a new line is displayed in the numeric trend, and the trend printing is marked with this number.

Anesthesia Record

With the AS/3 Anesthesia Record Keeper drugs, fluids, events and other comments can be included to the automatic patient chart.

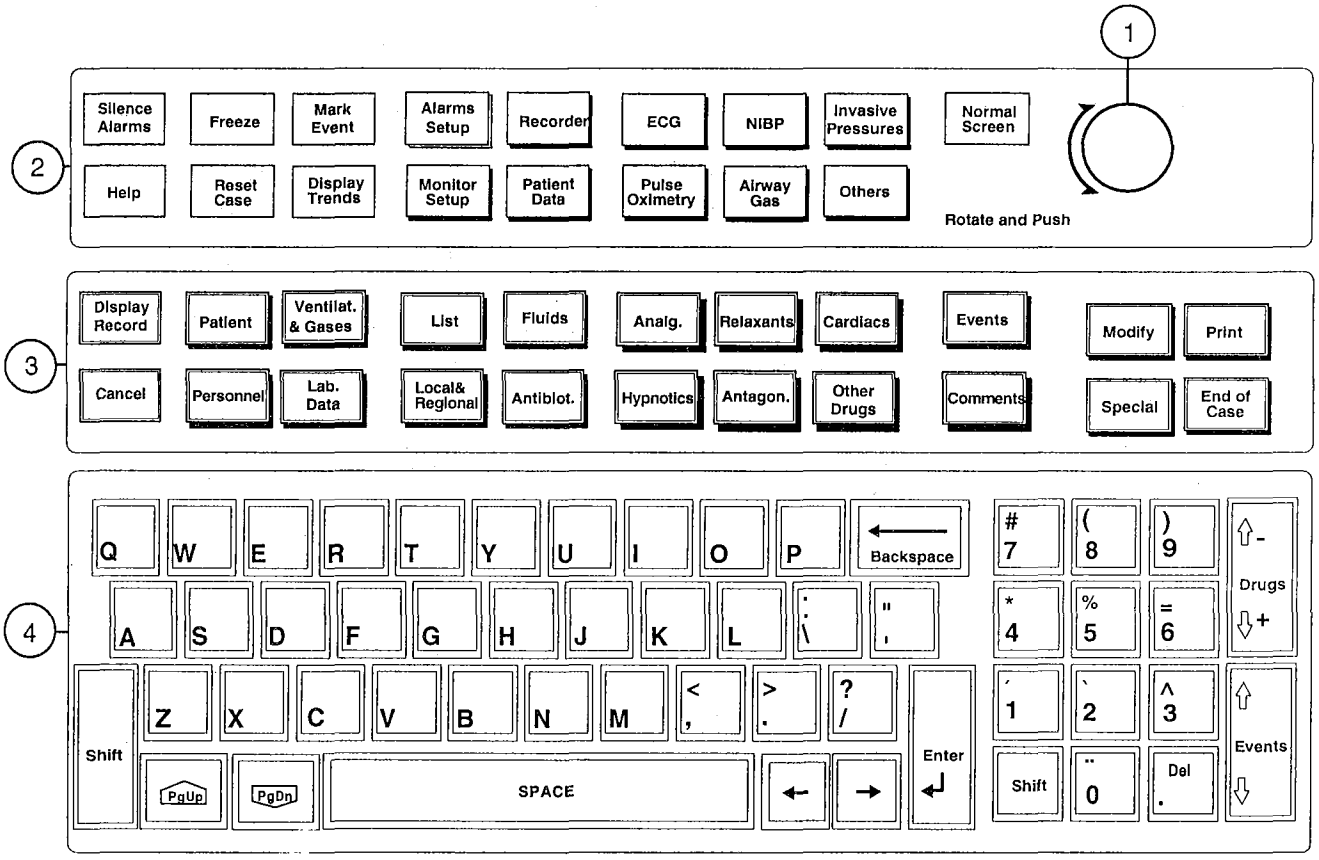


Figure 7-1 Anesthesia Keyboard keys

(1) ComWheel
(2) Command Board
(3) Anesthesia Record Keeper function keys
(4) Alphanumeric keys

The Anesthesia Record Keeper is operated according to the same principles as the AS/3 Anesthesia Monitor.

For more detailed information read the Datex AS/3 Anesthesia Record Keeper Operator's Manual.

Information Storage and Transfer

Patient data is always stored either in the monitor itself, on a memory card or on the hard disk of the AS/3 Anesthesia Information Centre.

When a Record Keeper is used either a memory Module or the Anesthesia Network is required.

Memory Module

The Memory Module holds two cards. The green Data card is for storage and transfer of patient information. The white Menu card is for storing the Record Keeper menus and configurations.

Place cards in correct module slot, green card to the slot labeled Data and white card to the slot labeled Menu.

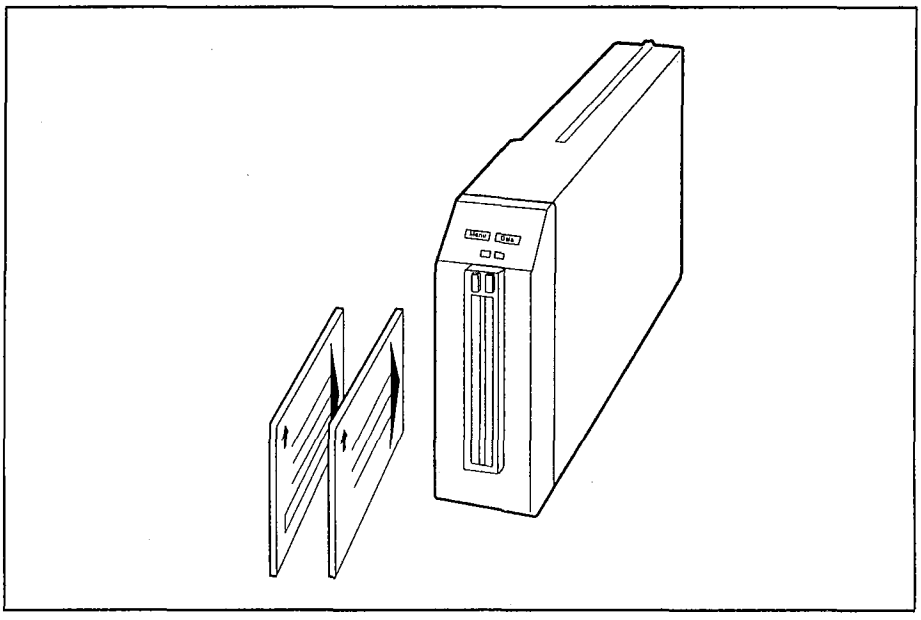


Figure 7-2 Memory Module

Inserting and Removing a Memory Card

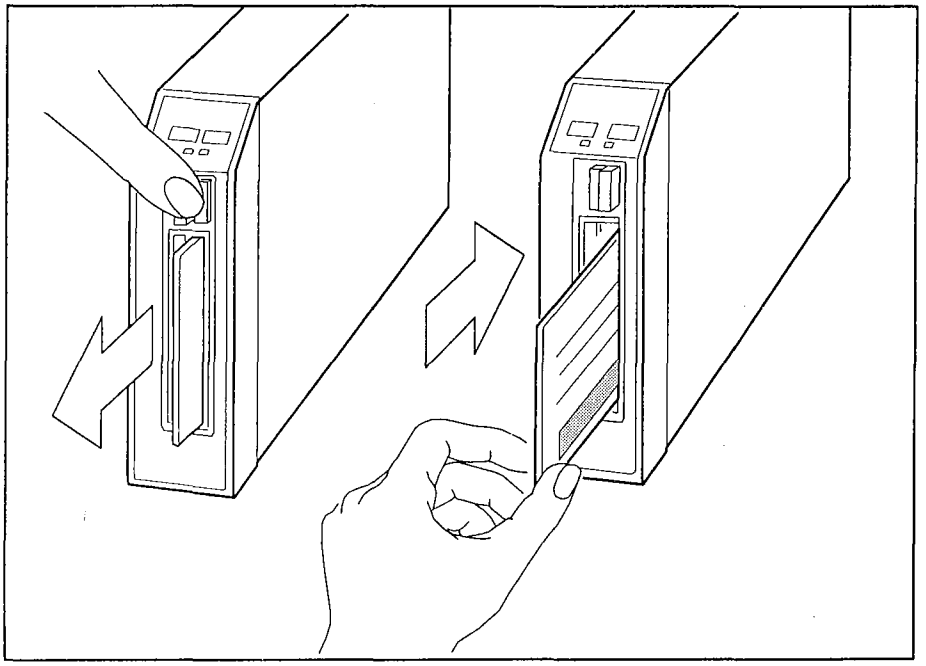


Figure 7-3 Memory Card

* Insert the card end with the small connectors first. Push the card firmly into it's place.

* Remove the card by pushing the release button above the card.

* Pull the card from it's slot.

CAUTION: Do not subject the memory cards to excessive heat, bending or magnetic fields.

Continue Chart or Record at Other Location

* Remove the Data card from the first monitor.

* Push the Data card into the monitor of the receiving end.

* Push the PATIENT key on the Record Keeper.

* Select "Patient from Card".

Datex

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8 PRINTING

Overview

Recorder

The Datex AS/3 Anesthesia Monitor Recorder Module, M-REC, provides single, dual and triple real time waveform recording, and single and dual recordings of numerical information. In addition it can print up to 24 hours graphical and numerical trend data.

NOTE: Printings on thermal paper may be destroyed when exposed to light, heat, alcohol etc. Take a photocopy for archives.

Laser Printing

The AS/3 Anesthesia Monitor can be connected to a laser printer either directly or via a network.

Graphical trends can be printed to the laser printer.

Recorder

Module Description

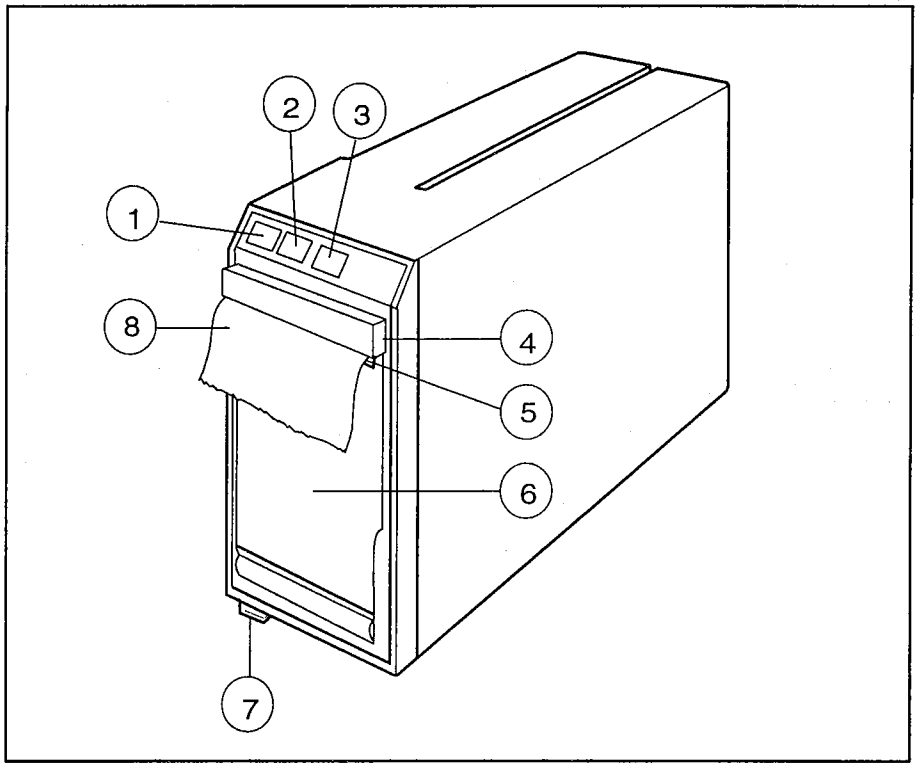


Figure 8-1 Recorder Module, M-REC

(1) RECORD WAVE key to record selected real-time waveforms
(2) PRINT TRENDS key to print numerical, graphical or tabular trends
(3) STOP key to cancel recording or trend printing
(4) Paper compartment lever
(5) Paper feed exit
(6) Recorder paper compartment
(7) Module release latch
(8) Recorder paper

Module Keys

There are three direct function keys on the module.

* Press the RECORD WAVE key to record selected real-time waveforms.
* Press the PRINT TRENDS key to print numerical, graphical, or tabular trends.
* Press the STOP key to cancel recording or trend printing.

Start Up

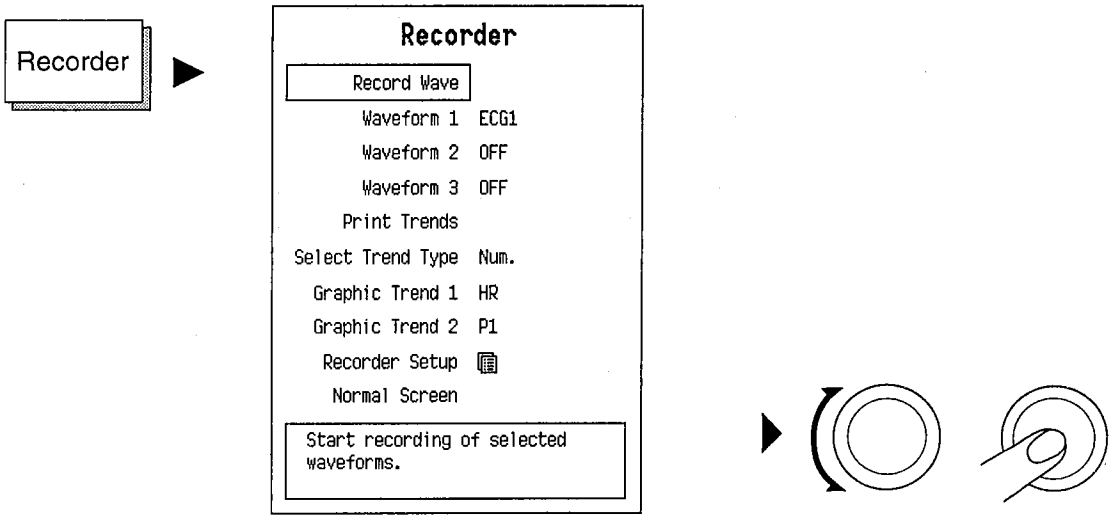
* Select the waveforms you wish to record from the Recorder menu. You may record up to three waveforms simultaneously.
* Press the RECORD WAVE key on the module to start recording or press the RECORDER key to start the recording in the Recorder menu.

Recording Waveforms

To record waveforms, do one of the following:

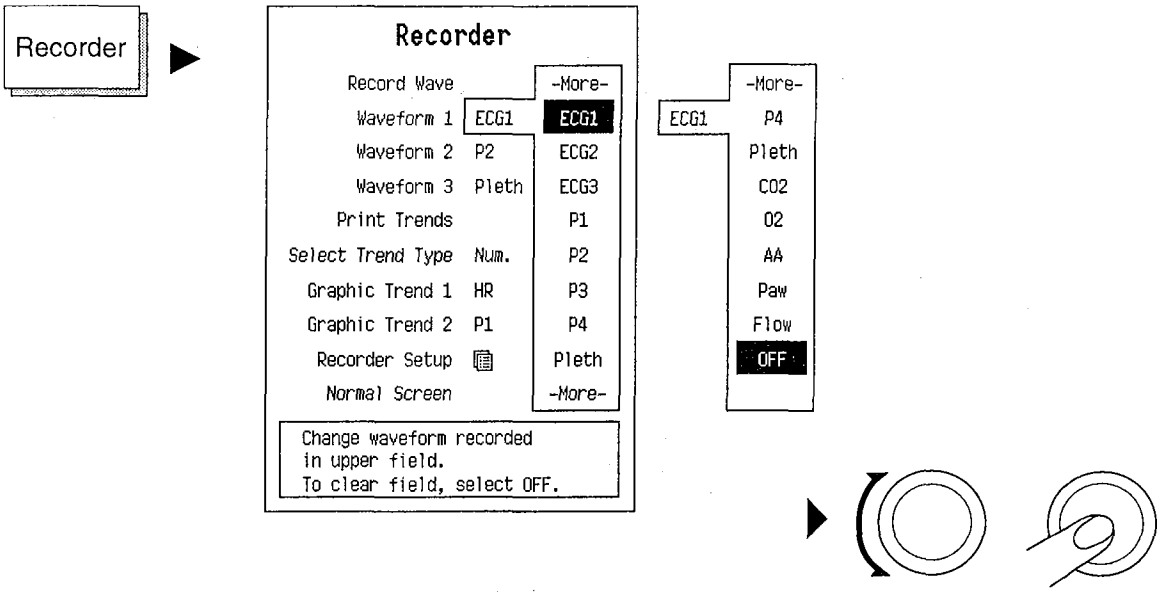
* Press the RECORD WAVE key on the module or,

* Press the RECORD WAVE key and select record wave in the Recorder menu



Selecting Waveforms

You can select up to three waveforms to be recorded.



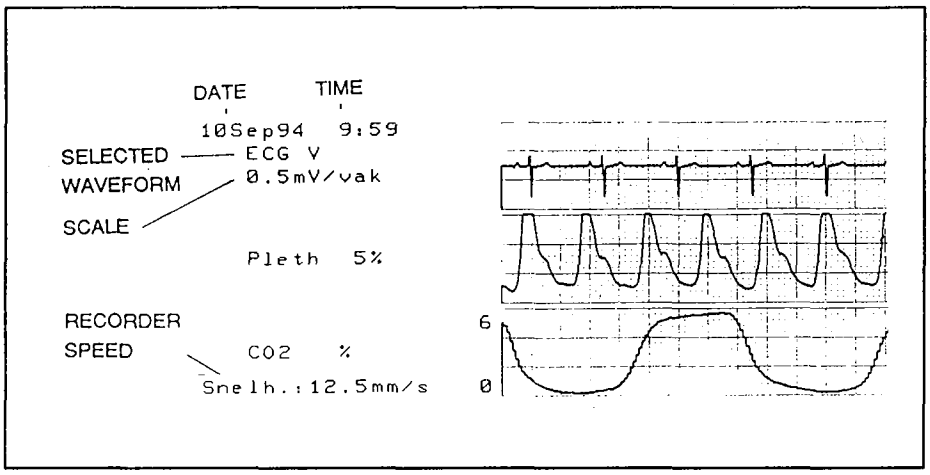


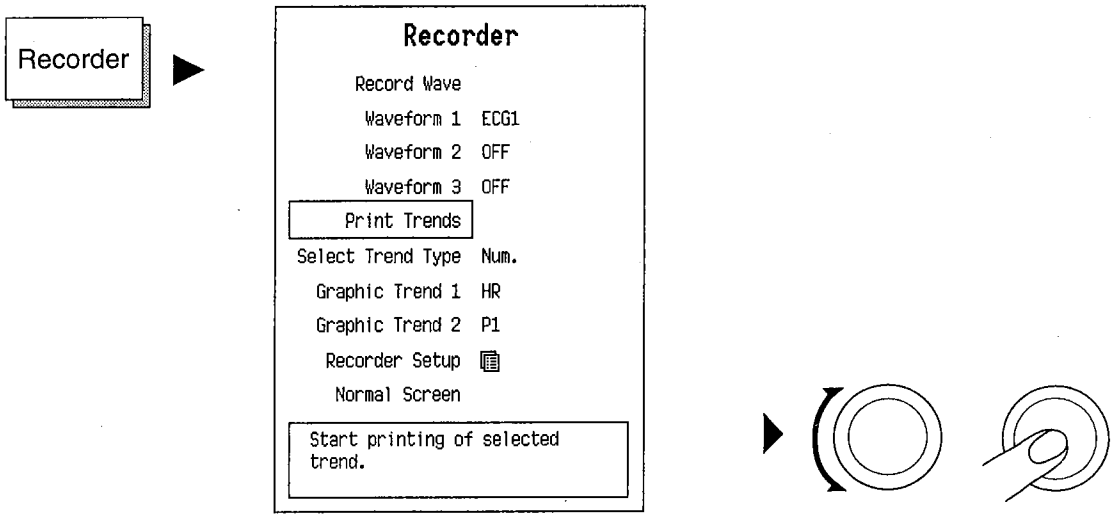
Figure 8-2 Sample Recording

NOTE: Waveform scaling follows the displayed parameter scaling, when applicable.

Printing Trends

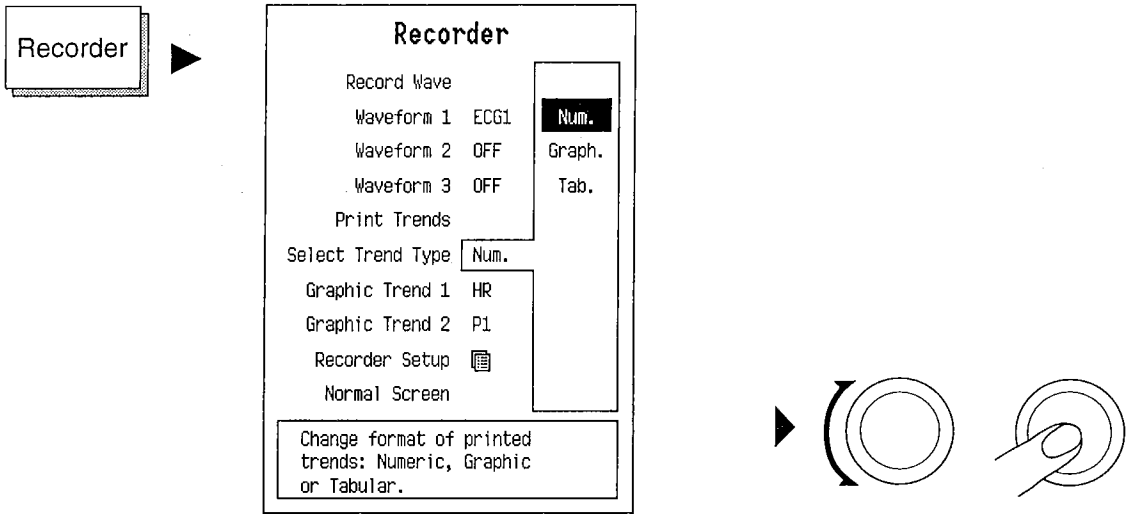
To print numerical, graphical, or tabular trends, do one of the following:

* Press the PRINT TRENDS key on the module, or
* Press the RECORDER key and select RECORD TREND in the Recorder menu.



Selecting Trend Type

You can select numerical, graphical or tabular trends to be printed.



The following parameters are printed in the numerical trend printout:

Table 8-1 Numerical Parameter Values and Units

PARAMETER	PRINTED VALUES AND UNITS
HR and SpO2	bpm/SpO2 %
NIBP	sys/dia or mean mmHg
P1 'Art'	sys/dia or mean mmHg
P2 'CVP'	sys/dia or mean mmHg
P3/PA	sys/dia or mean mmHg
P4	sys/dia or mean mmHg
PCWP	mean
T1/T2	Celcius or Fahrenheit
CO2	ET/FI % kPa, or mmHg
O2	ET/FI %
AA	ET/FI%
Resp rate	Breaths per minute

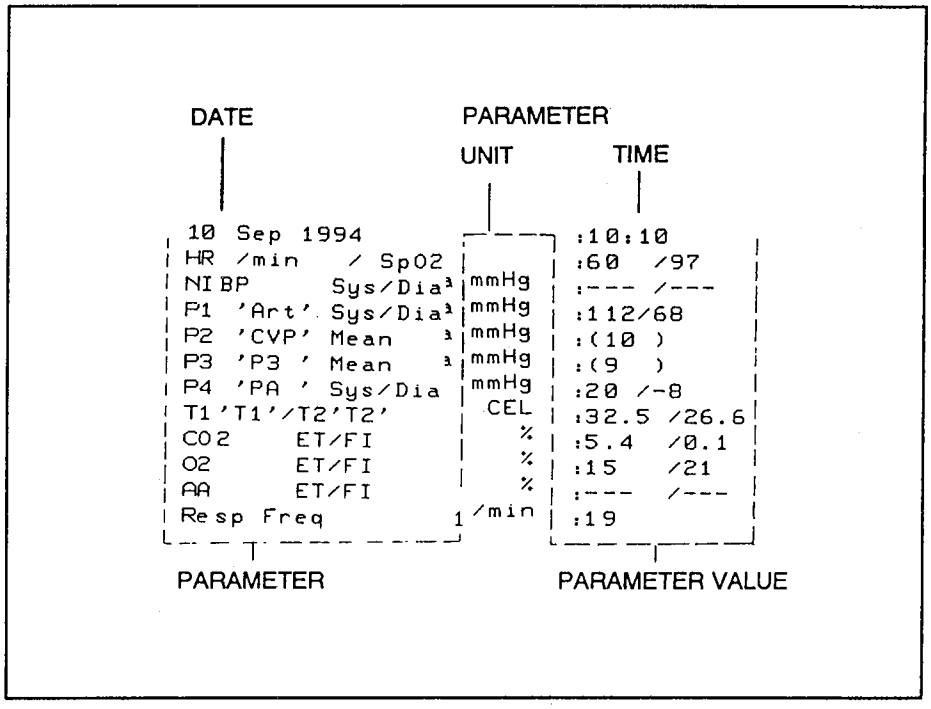


Figure 8-3 Numerical Trend Printout

For pressures either Sys/Dia or mean are printed depending on the digit format selected in the pressure setups.

PCWP is measured from the pressure channel which is labeled PA.

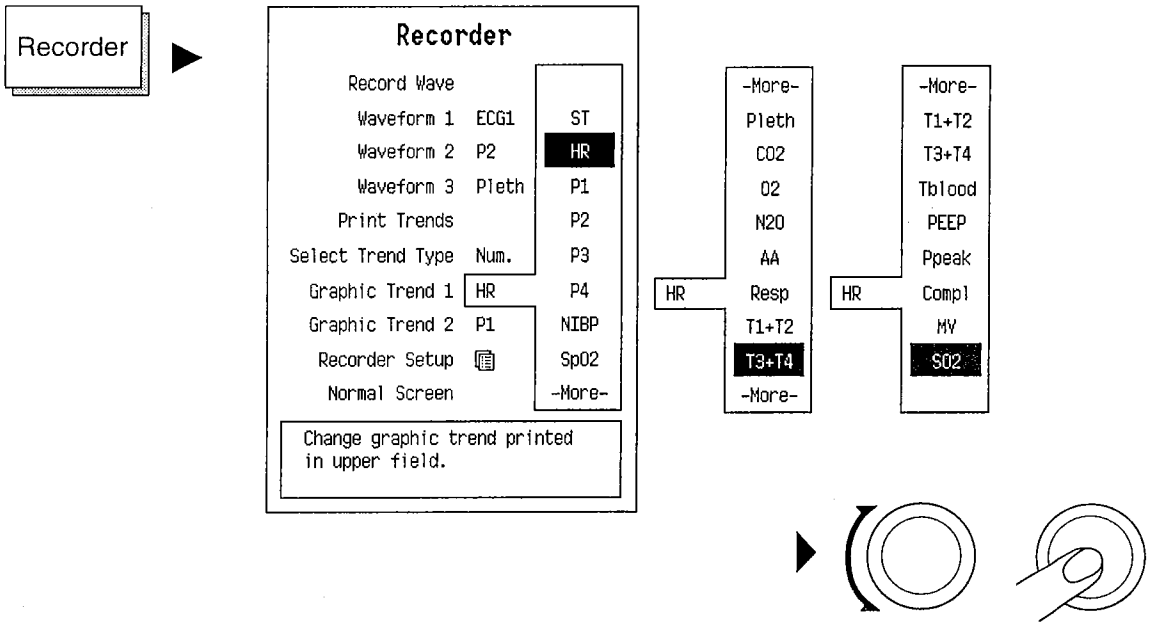
The following parameters are printed in the tabular trend printout:

Table 8-2 Tabular Parameter Values and Units

PARAMETER	PRINTED VALUES AND UNITS
HR	bpm
SpO2	%
NIBP or Art	sys/dia mmHg
CO2	ET %, mmHg, kPa

Selecting Graphical Trends

You can select up to two graphical trends to be printed of all the parameters which have a graphical trend.

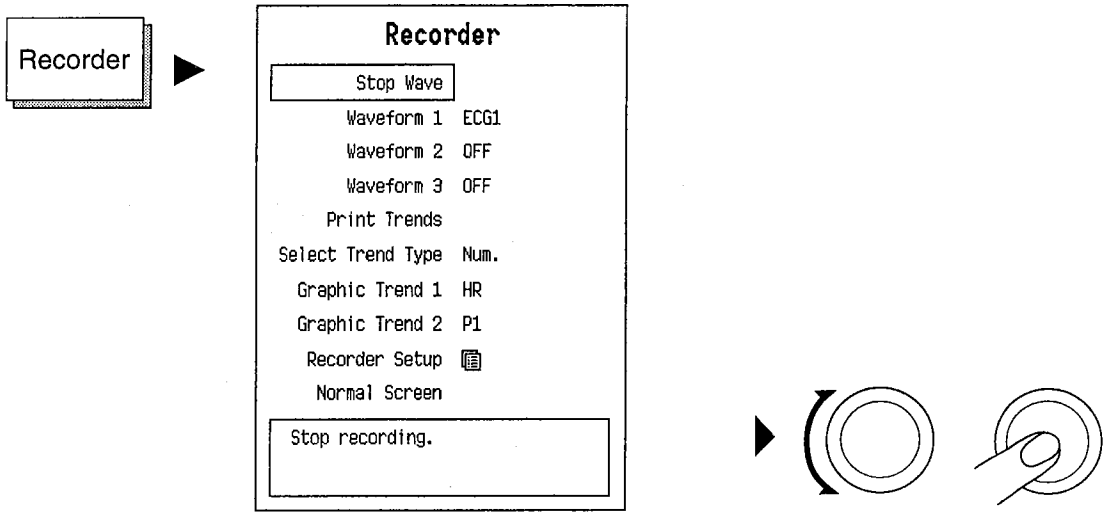


Stop Recording

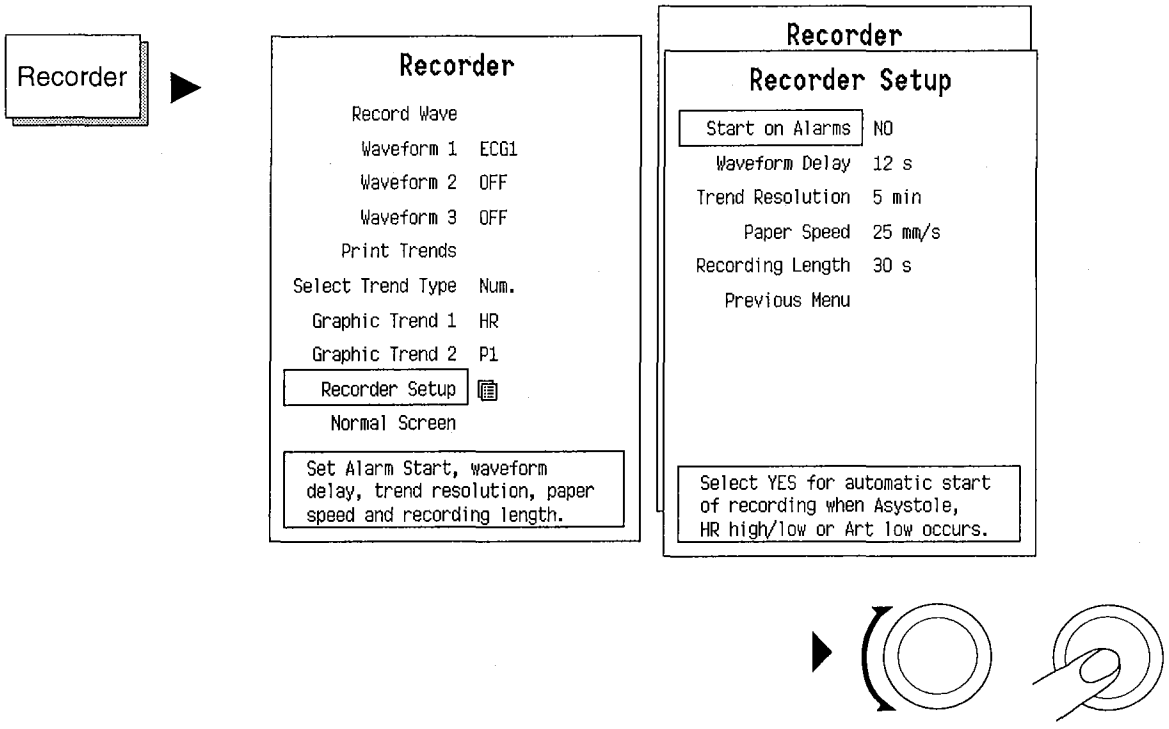
To stop recording, do one of the following:

* Press the STOP key on the module, or

* Press the RECORDER key and select STOP WAVE / STOP TREND in the Recorder menu.



Recorder Setup



ALARMS START

Allows you to choose if the recorder is activated by an alarm. The selections are ON/OFF.

Recording will start from following alarms:

Table 8-3 Alarm Recordings

ALARM	RECORDING PARAMETER
Asystole	ECG1 + P1 waveforms, 25 mm/sec
HR HIGH/LOW	ECG1 + P1 waveforms, 25 mm/sec
P1 HIGH/LOW	ECG1 + P1 waveforms, 25 mm/sec

Recording time 30 seconds. 12 seconds recording from the recorder memory, 18 sec real-time recording,
Alarm recordings are annotated also with the alarm source.

WAVEFORM DELAY

Allows you to select the amount of waveform data (in seconds) that will be stored in the recorder memory and printed before real-time waveform. The choices are: OFF or 12 seconds.

TREND RESOLUTION Allows you to select the resolution of a numerical trend printing: every 1 minute, 5 minutes, 10 minutes, 30 minutes, or after every NIBP measurement.

PAPER SPEED Selects the paper speed 6.25, 12.5, or 25 mm/seconds.

RECORDING LENGTH
Allows you to select the printing time. The selection is 30 seconds or CONTINUOUS.

PREVIOUS MENU Returns to the previous menu level.

Recorder Paper Replacement

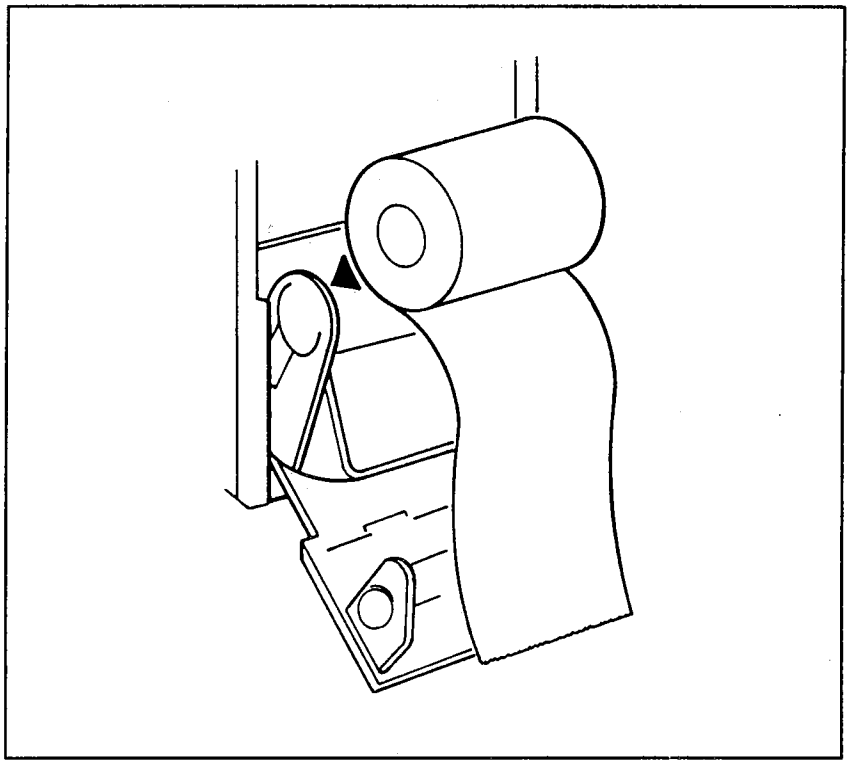


Figure 8-4 Recorder Paper Replacement

Messages

The messages appear in the general message field.

Recorder: out of paper

Recorder: cover open

Recorder: thermal array overheat

Recorder: input voltage low

Recorder: input voltage high

Recorder: system error 1/2/3

Recorder: module removed

Laser Printer

The difference between the recorder and the laser printer is that while the recorder can be independently configured to print desired graphs, numerics or waveforms, the laser printer prints the graphical trends as configured in the trends function.

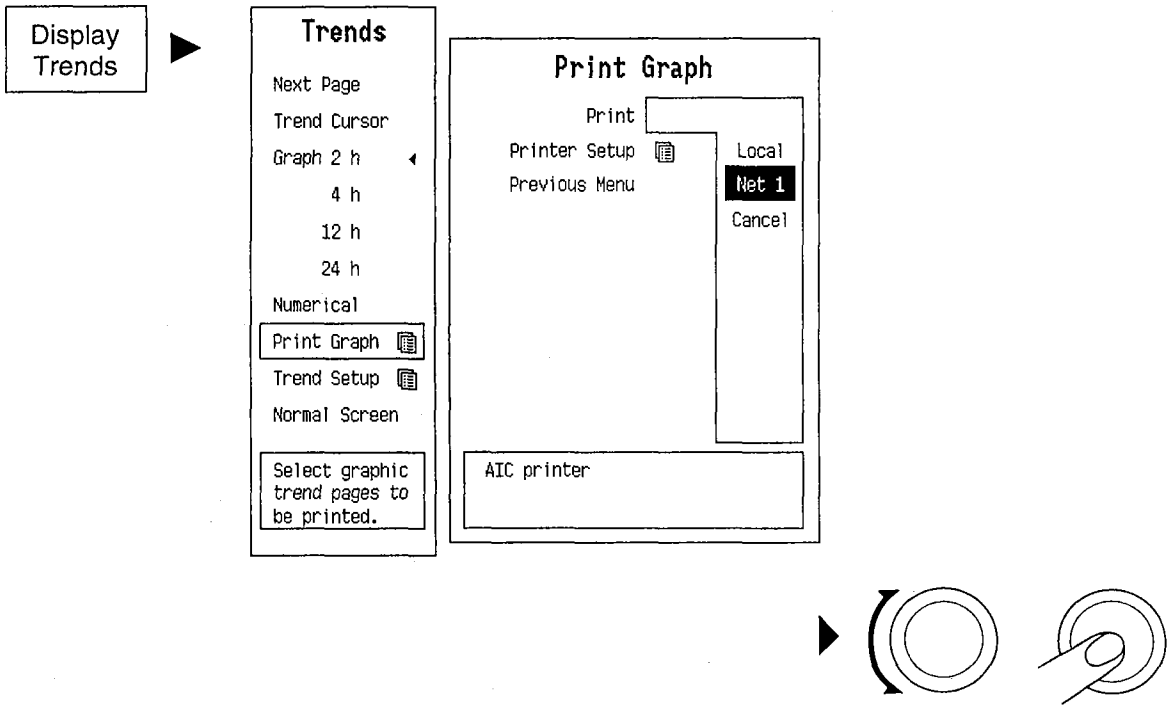
Printing

1 Push the Display Trends key

2 Select Print Graph

3 Push the ComWheel at the highlighted Print selection in the Print Graph menu.

4 Select Local if the printer is connected to your monitor or select Net if your monitor is connected to a Datex Anesthesia Network and the printer is located somewhere else.



Trend Page Setup

Each trend page in the print graph menu can be separately setup to include a desired combination of patient information.

The trend page consists of fields and the content of each field is defined in the Trend Setup menu. For more information see chapter 6 Trends.

Trend Printouts

The graphical trend pages to be printed are marked by a small arrow in the Print Graph menu.

To select another trend page to be printed highlight the desired trend page and push the ComWheel. To print, return the highlight to the Print selection and push the ComWheel.

The first Trend Page to be printed, is labelled P1.

The next Trend Page is subsequently labelled P2.

See example on the next page.

Anesthesia Record Printouts

When a Datex AS/3 Anesthesia Record Keeper is connected to your monitor, one of the trend pages can be set up to include drug fields, event fields and other information in addition to the patient parameter trends.

See example on the next pages.

Trend printout		Identification:	P1
Date:	12 Aug 1994		
Time:	14:28		
Hospital:	Verkkokorttien Laadunmittaus		
Department:	Verkkokorttien Laadunmittau	Notes:	
OR:	Etana		
Patient Id:			
Last name:			
First name:			

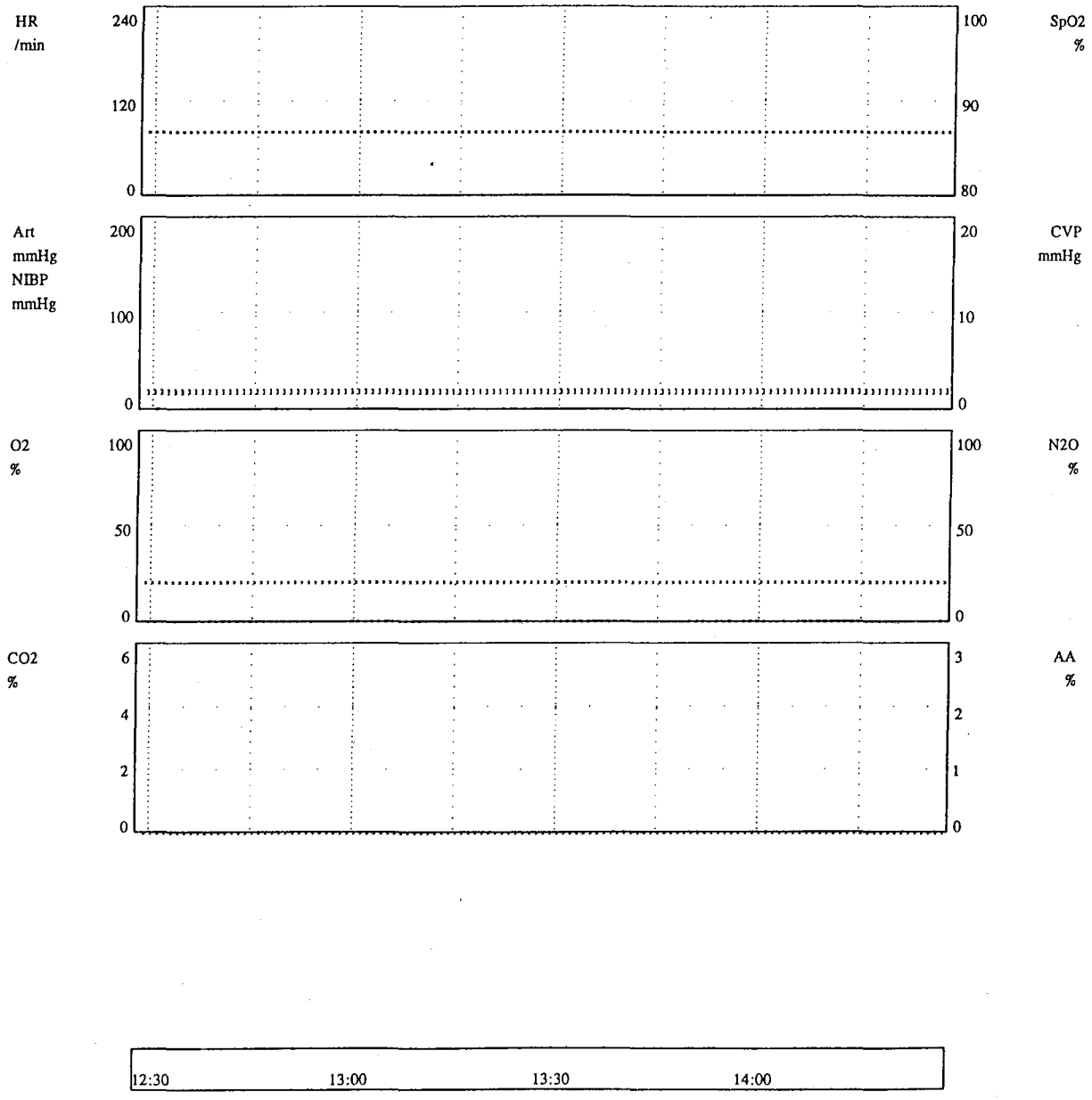


Figure 8-5 Trend Printout

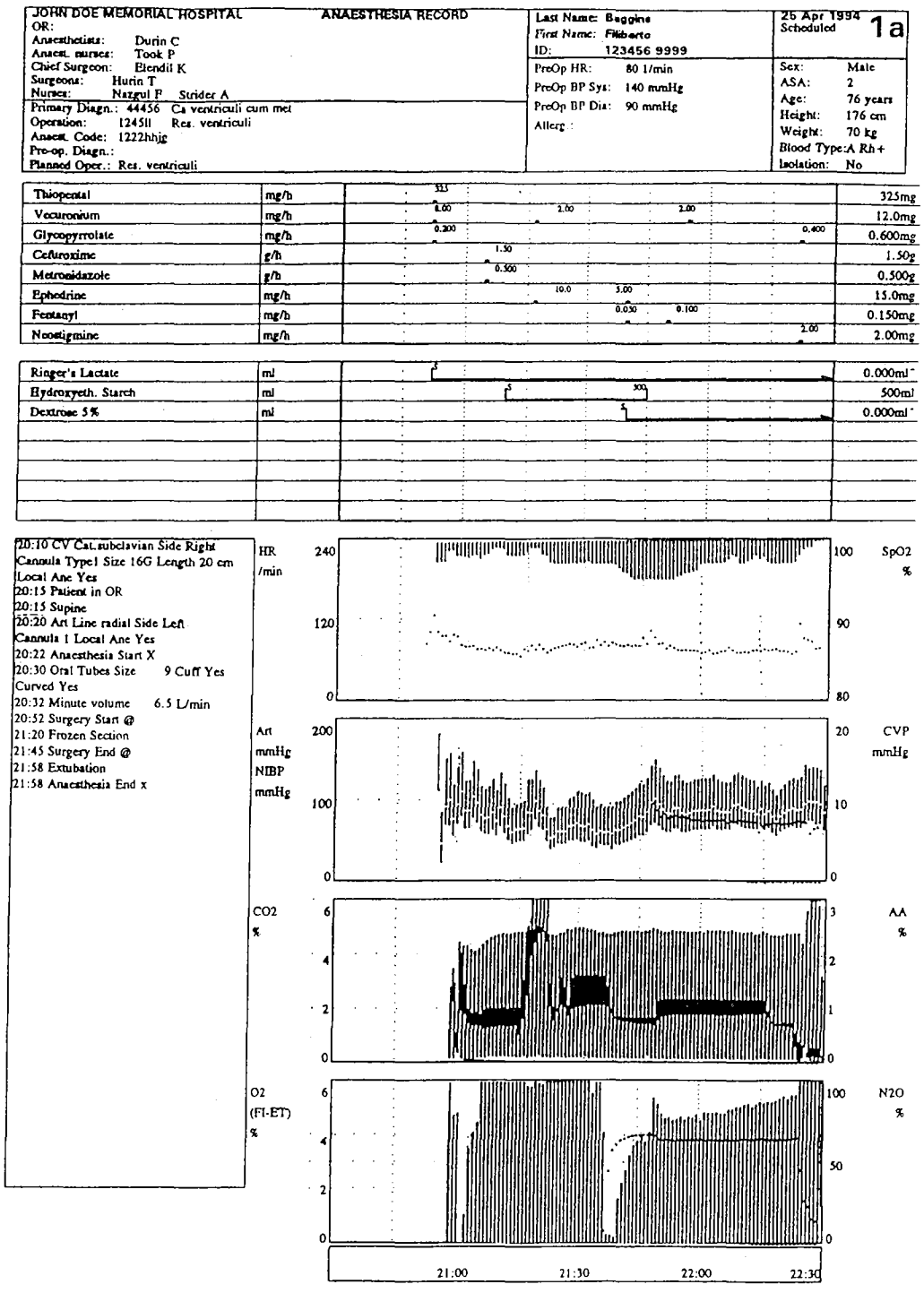


Figure 8-6 Anesthesia Record Printout

Datex

PREVENTATIVE MAINTENANCE SCHEDULE

Datex Technical Support recommends the following Preventative Maintenance for all monitors equipped with a D-fend water separation system:

- **Replace D-fend:** At a minimum, every sixty (60) days, or if the **REPLACE TRAP** message is displayed on the monitor.

  [**NOTE**: High humidity cases or bronchodilators will shorten the lifespan of the D-fend water traps]

- **Replace Fan Filter:** Check regularly, replace when contaminated.

- **Replace Internal Nafion Tubes:** Annually.

By adhering to a Preventative Maintenance Schedule, you will minimize downtime of your Datex monitor, and extend the life of the monitors internal gas analyzers.

Datex Technical Support has P.M. Kits available for your monitor, please call for part numbers and prices.

Attention: Failure to adhere to Preventative Maintenance Schedule could affect the terms of your warranty.

TECHNICAL SUPPORT 1-800-555-2712

March 1995

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9 CLEANING & MAINTENANCE

General

Always unplug the electric power cord before cleaning the monitor.

The appropriate cleaning procedure depends on where and how the accessory is used and on the patient condition.

CAUTION: Do not perform any cleaning or maintenance procedures other than those described here.

Cleaning

When accessory is in contact with healthy skin

* Gently wipe with a detergent.
* Rinse when recommended by the detergent manufacturer.
* Allow the accessory to dry completely.

Cleaning and Disinfection

When accessory is in contact with mucous of healthy patient

* Disinfect the cleaned accessory with disinfectant such as ethanol-, isopropyl alcohol or with chlorine compounds.
* Do not use hypochlorine for disinfection.
* If the accessory is immersed in disinfectant, the accessory must be properly rinsed and dried.

Cleaning and Sterilization

When accessory is in contact with mucous and the patients membrane is broken or the patient has a contagious infection.

* Steam autoclave at 121° C or
* Sterilize the accessory e.g. with ethylene oxide mixture at a maximum temperature of 60° C / 140° F.

Monitor Casing

Wipe with a mild detergent solution such as the Datex Cleaning Fluid. Make sure not to leave any liquid spills on any metal part.

Power Supply

The power supply includes a battery for the purpose of a 15 min information backup saving. The battery should be replaced if the monitor information is not saved for 15 minutes after power has been cut off. The battery should be replaced by trained service personnel only.

ECG Cables and NIBP Cuff Hose

The cables and hose can be wiped with a mild detergent solution. When necessary disinfect.

NIBP Cuff

Clean only when necessary. Remove the bladder from the manschett. Wash the bladder and manschett in a mild detergent solution. OBSERVE that alcohol may NOT be used.

Temperature Probes

Clean with a mild detergent solution and rinse with water. Disinfect or sterilize when necessary.

Cables for Invasive Pressure and Cardiac Output Measurement

Wipe with a mild detergent solution. Disinfect when necessary.

Pulse Oximetry Sensors

Take possible patient allergies into account when selecting cleaning agent.

* Detach the sensor from the patient and the monitor.
* Wipe the sensor with a mild detergent solution. Allow it to dry completely before use.
* When necessary use a chlorine compound for disinfection.

CAUTION: Do not soak or immerse sensors in any liquid solution. Do not autoclave with steam.

WARNING: PATIENT SAFETY: A damaged sensor, or a sensor soaked in a liquid, may cause burns during electrosurgery.

CAUTION: Do not under any circumstance use hypochlorine for disinfection.

The sensors may be sterilized using an ethylene oxide mixture at 50 to 60°C / 120 to 140°F. Follow the recommendations of the sterilizer manufacturer for required aeration periods.

NOTE: After ethylene oxide sterilization, sensors must be well aerated in a ventilated place.

The pulse oximetry sensors are latex free.

Airway Adapter

Throw a single use adapter away after each patient.

A reusable adapter can be disinfected as described above. A reusable steel adapter may be autoclaved.

If you want to clean the adapter before use: submerge the adapter in a 70% alcohol solution for 30 seconds and rinse carefully with water.

Make sure that all traces of alcohol or detergent are rinsed away or dried before measuring a patient.

Sampling Line

Do not reuse the sampling line. Reusing a cleaned sampling line may affect measurement results.

D-fend Water Trap

The patented water separation system, D-fend, of the Airway Module is based on a hydrophobic membrane, which prevents water and secretions from entering the measuring chamber. This protects the internal optical components for long lifetime and reliability. Condensed water and saliva are collected into a washable container.

Black D-fend is disposable, but not for single patient use. Replace it every 2 months or when an OCCLUSION or a REPLACE TRAP alarm persists.

Green D-fend+ is for patients with extensive mucus secretion and for single patient use only. Replace it every 24 hours or when an OCCLUSION or a REPLACE TRAP alarm persists.

To lengthen the lifetime of your monitor and minimize downtime:

* Empty the water trap container whenever more than half full.
* Do not open, wash or sterilize your D-fend.
* In case of washing or disinfecting adapter or water trap container take care that there is no alcohol nor detergent left when used again.
* Do not force air nor oxygen through D-fend.
* Prevent smoke and dust from entering D-fend.
* While administering nebulized medication disconnect gas sampling line from patient circuit.

When an OCCLUSION alarm occurs:

* Confirm that sampling line is not kinked etc.
* Remove sampling line from the airway adapter and plug the sampling port of the adapter. Let the monitor sample room air to remove water drops from the line.
* Replace the sampling line.
* Replace the water trap.

CAUTION: Do not disinfect or open the water trap cartridge. Do not touch the water trap membrane.

Emptying Water Trap Container

Change or clean the container between patients. Empty it during monitoring whenever it is more than half full.

WARNING: OCCUPATIONAL SAFETY: Handle water trap as you would any body fluid. Infection hazard may be present.

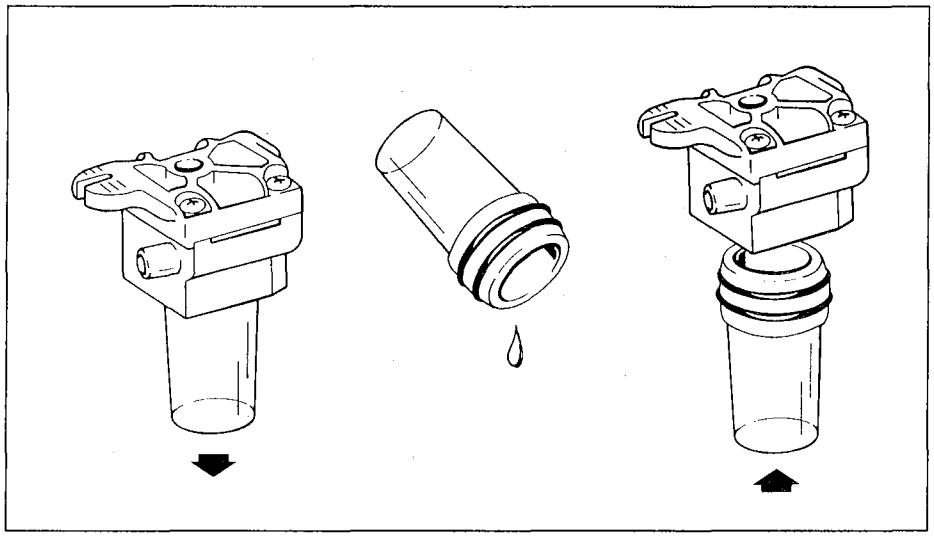

Figure 9-1 Emptying the Water Trap Container

Follow this procedure:

* To remove the water trap, push the water trap latch to the right. The water trap is spring-loaded. The message AIR LEAK will be displayed.

* Detach the container from the water trap cartridge by pulling it carefully downward.

* Empty the container. Between patients, disinfect the container with cleaning solution or sterilize it with cold chemicals or ethylene oxide.

* Attach the container back into the cartridge tightly.

* Push the whole unit into its housing on the front panel until the latch is set. Press NORMAL SCREEN to restart monitoring. Check that the message AIR LEAK disappears.

Datex recommends that the complete D-fend is replaced every two months (D-fend+ every 24 hours) or when the monitor displays the REPLACE TRAP message or the OCCLUSION message persists.

Clean the water trap container by rinsing with water. When necessary use a disinfectant solution or sterilize using cold chemicals or ethylene oxide.

Make sure that all traces of alcohol or detergent are rinsed away and dried before measuring a patient.

The D-fend hydrophobic membrane is damaged if any cleaning is attempted other than rinsing with water.

Disinfecting Water Trap Container

The water trap container can be cleaned with disinfection solutions or sterilized using cold chemicals or ethylene oxide. Follow the sterilizer manufacturer's recommendations for aeration periods after ethylene oxide treatment.

NOTE: Traces of alcohol or other organic cleaning solutions may affect readouts.

Airway Module

The internal sampling system of the Airway Module does not need to be cleaned nor sterilized. There is no reverse flow back to the patient. If it is suspected that the measuring chamber is dirty (e.g., gas zero error), the Airway Module should be serviced by authorized service personnel.

Dust Filter for Cooling Fan

The filter on the rear panel of the Central Unit and Airway Module should be checked on a regular basis, and cleaned at least once a month. Follow this procedure:

* Remove the filter by pulling out the material with fingers. Do not remove any screws! Shake or blow out the dust.

* Let the filter soak in a mild detergent solution.

* Rinse the filter and let dry before attaching back to the fan.

If the filter material can not be cleaned or the filter is damaged, replace it with a new one.

CAUTION: Do not replace the filter with any other filter type or any other material! Limited cooling effectivity may damage the monitor.

Other

Other maintenance procedures are described in the Service Manual. See paragraph Preventive Maintenance Check List at the end of the appropriate chapter.

CAUTION: Only authorized service personnel are allowed to perform service maintenance.

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10 TROUBLESHOOTING

The troubleshooting chapter consists of three parts which together should help you resolve the most common monitoring problems

Checklist

Check the following items to ensure you have remembered to make all essential preparations before monitoring or if any problems occur during monitoring.

General

* the monitor and it's modules don't have any visual defects such as cracks or loose parts.
* power cord is connected to electrical wall outlet and to the rear of the AS/3 AM Central Unit
* Display Unit power cord is connected to the rear of the Central Unit
* Command Board cable is connected to High Resolution Display Controller, B-DHIGH
* the modules are pushed properly into the Central Unit and that the monitor recognizes the module (parameter appears on display and the menu selections are active).
* Gas Interface Cable is connected to the connector of the Gas Interface Board, B-GAS at the rear of the Central Unit.
* D-fend water trap is empty and that the D-fend is properly pushed into it's place
* the sampling line is connected to the Airway Module
* patient connection cables are attached to the modules so that the color coding on the plug matches the color coding on the module connector
* Trends of the previous patient are erased
* alarm limits are appropriate for new patient

ECG

* electrode gel is moist
* electrodes have good skin contact
* electrodes are positioned correctly
* correct leadwire set is selected (either 3 or 5 lead)
* ECG extension cable is plugged to the blue connector at the module
* leadwire set is properly connected to the extension cable
* correct leadwire type is selected at the ECG Setup menu
* Pacemaker selection in the ECG Setup menu is Show when a pacemaker is used.
* ECG is selected for display at the Monitor Setup menu

Pulse Oximetry

* Only one module with pulse oximetry measurement is inserted into the Central Unit (with the exception of M-NSAT)
* correct SpO_2 sensor is selected for each patient size
* the sensor is completely dry after cleaning
* SpO_2 extension cable is plugged to the gray connector at the module
* sensor cable is properly connected to the extension cable
* sensor is positioned correctly to the patient
* SpO_2 is selected for display at the Monitor Setup menu

Temperature

* temperature probe is YSI-400 or equivalent

* temperature probe is pushed properly into the connector on the module
* temperature is selected for display at the Monitor Setup menu
* temperature probe is positioned correctly

Invasive Blood Pressure

* invasive blood pressure transducer cable is plugged to a red connector on the module
* pressure transducer is connected to the cable
* patient catheter is connected to the pressure line
* there is no air in the transducer dome or the catheter line
* transducer is at mid heart level
* pressure transducer is zeroed
* one pressure channel is labelled as PA when measuring PCWP
* invasive blood pressure is selected for display at the Monitor Setup menu

Cardiac Output

* catheter connecting cable is plugged to a blue C.O. connector of the module
* injectate temperature probe is connected to the connecting cable
* connecting cable is plugged to the catheter thermistor and to the injectate temperature probe
* syringe is connected to the catheter proximal CVP lumen
* correct catheter type is selected C.O. Setup menu

* computational constant is given if other than Abbott or Baxter catheters are used
* correct injectate volume of 3, 5 or 10 ml is selected
* injectate temperature is displayed in the C.O. View
* patient height and weight are given in the Patient Data / Demographics menu if Cardiac Index is desired
* C.O. is selected for display at the Monitor Setup menu

Non-invasive Blood Pressure NIBP

* correct hose, black NIBP hose for adults and children and white hose for infants
* O-rings on hose connectors are intact, two at module side
* NIBP hose is properly connected to the module and will not come away by pulling
* correct NIBP cuff for patient size
* O-ring on cuff connector is intact and connector firmly pushed inside the cuff tube
* no holes or cracks in the cuff bladder or cuff tube
* symbol indicating the center of the bladder is over the artery
* all residual air is squeezed out of the cuff before wrapping it around the arm
* cuff is wrapped firmly around the arm, not loose
* cuff is at mid-heart level
* cuff tubes or NIBP tube is not kinked or squeezed together
* if leak is suspected, start venous stasis and check that the pressure is stable during stasis
* non-invasive blood pressure is selected for display at the Monitor Setup menu

Airway Gases

* D-fend water trap is locked into the module
* water trap container is empty
* a new sampling line is used after each patient
* sampling line is connected to the water trap
* monitor is turned on and self-check is performed with the sampling line attached
* sampling line is connected to the airway adapter
* correct place for humidification and/or bacteria filter
* breathing circuit or accessories have no residuals of alcohol based disinfectants
* desired gas parameter is selected for display at the Monitor Setup menu

Side Stream Spirometry

* correct flow sensor (D-lite for adults and Pedi-lite for pediatrics)
* correct flow sensor type is selected at the Airway Gas / Flow & Vol Setup or Paw Setup menus
* correct sensor type is selected in the Flow & Vol Setup menu
* straight luer connectors of the spirometry tube are attached to the connector on the Airway Gas module and the angled luer connectors are attached to the sensor
* spirometry tube is not kinked or squeezed together
* correct place for humidification and/or bacteria filter
* desired SSS parameter is selected for display at the Monitor Setup menu

Messages and Explanations

Table 10-1 System Messages

SYSTEM	
MESSAGE	**EXPLANATION**
EPROM error	Software cassette is faulty. Replace software cassette.
EEPROM error	Faulty EEPROM circuit on the CPU board. Call service to replace CPU.
RAM error	Faulty RAM circuit on the CPU board. Call service to replace CPU.
SRAM error	Faulty SRAM circuit on the CPU board. Call service to replace CPU.
B-INT EPROM error	Call service to replace Interface Board B-INT.
B-INT RAM error	Call service to replace Interface Board B-INT.
Interfaced gas monitor removed	The interfaced gas monitor is either disconnected or it has been turned off.
Interfaced NIBP monitor removed	The interfaced NIBP monitor is either disconnected or it has been turned off.
Interfaced SpO2 monitor removed	The interfaced SpO2 monitor is either disconnected or it has been turned off.
Interfaced SvO2 monitor removed	The interfaced SvO2 monitor is either disconnected or it has been turned off.
X-Module removed	Message when a module is removed during monitoring. Push the module so that it locks into it's slot.
X-Module inserted	Message when a module is inserted during monitoring.

Table 10-2 Recorder and Printer Messages

RECORDER AND LASER PRINTER	
MESSAGE	**EXPLANATION**
Recorder: out of paper	Insert new roll of paper.
Recorder: cover open	The lid of the recorder module is open.
Recorder: thermal array overheat	Wait for the recorder to cool down.
Recorder: input voltage low	Call service to check the Central Unit frame and power unit.
Recorder: input voltage high	
Recorder: system error 1/2/3	
Printing..	Laser is printing
Printer failure	Printing has failed. Controll the printer and the cable connections.

Table 10-3 ECG Messages

ECG	
MESSAGE	**EXPLANATION**
ASYSTOLE	Asystole, no QRS detected in ECG. This does not depend on heart rate source.
HR high	HR equal or above upper alarm limit.
HR low	HR equal or below lower alarm limit.
LEADS OFF	Cable disconnections. ECG cable, all leads or neutral electrode (RL/N) are off.
NOISE	Unreliable HR calculation or distorted waveform due to: too much high frequency or electrical mains noise in ECG the DC offset voltage between two electrodes is too high.

Table 10-4 Pulse Oximetry Messages

PULSE OXIMETRY	
MESSAGE	**EXPLANATION**
SpO2 Low	SpO2 equal or below alarm limit.
SpO2 High	SpO2 equal or above alarm limit.
HR Low	Pulse rate equal or below alarm limit.
HR High	Pulse rate equal or above alarm limit.
No SpO2 pulse	Pulse signal is found and then lost for 10 seconds and longer.
No SpO2 probe	Sensor is not connected to the module.
SpO2 probe off	Sensor is not attached to the patient.
SpO2 Check Probe	Pulse search active for 20 seconds but no acceptable pulse is found. Either there is no detectable SpO2 signal, the sensor is faulty or it is detached from the patient.

Table 10-5 Invasive Blood Pressure Messages

INVASIVE BLOOD PRESSURE	
MESSAGE	**EXPLANATION**
P1 low P2 low P3 low P4 low	Invasive pressure of marked channel equal or below alarm limit
P1 high P2 high P3 high P4 high	Invasive pressure equal or above alarm limit
HR low	Heart rate equal or below alarm limit
HR high	Hear rate equal or above alarm limit
No P1 transducer No P2 transducer No P3 transducer No P4 transducer	Transducer or pressure cable not connected

Table 10-6 Cardiac Output Messages 1

CARDIAC OUTPUT	
MESSAGE	**EXPLANATION**
Curve Under Range	Measured temperature changes are not sufficient for C.O. calculation. Check that right injectate port is used. Use colder injectate, or larger volume.
Curve Over Range	Measured temperature difference is too large. Check that right injectate port is used. Use smaller injectate.
C.O. Out of Range	C.O. value is less than 0.1 l/min or more than 20 l/min.
Tblood Under/ Over Range	The measured blood temperature is out of range. Wait until message disappears before starting the measurement anew.
No Catheter	No catheter connected or connecting cable is faulty. Check connections. Run the C.O. self test to check the cable. If it is O.K., the catheter is faulty.
Noisy Baseline	There is random or continuous change in the patient's blood temperature. This may affect the C.O. value, especially with high flow, or with small volume and room temperature injectates.
Irregular Curve	The measured temperature changes do not form a curve suitable for C.O. calculation. Inject the injectate smoothly, not too fast and not too slow. Also patient's breathing or arrhythmia may interfere with the curve.
Injectate too Warm	The injectate temperature is too close to blood temperature, or it is too warm (more than 27 degrees C). Use colder injectate.

Table 10-7 Cardiac Output Messages 2

CARDIAC OUTPUT	
MESSAGE	**EXPLANATION**
No C.C. Check C.O. Setup	No computation constant can be found for the system injectate volume-catheter-injectate probe. Check the information given in C.O. Setup menu.

Table 10-8 NIBP Messages 1

NIBP	
MESSAGE	**EXPLANATION**
NIBP high	NIBP value is equal or above alarm limit
NIBP low	NIBP value is equal or below alarm limit
NIBP Cuff loose	Cuff is not attached to the patient or it is too loose. The hose is not connected to the module.
NIBP Air leakage	Air leakage in cuff or hose. Check all connections and test the tightness using venous stasis. Repumping during the 2 min period indicates a leakage
NIBP manual	when autocycling mode is interrupted because of air leakage or loose cuff
NIBP Cuff occlusion	Check cuff hose and tubes and restart measurement If problem persists, replace the module and call service to check internal tubings and the calibration
Weak pulsation	weak or unstable oscillation signal due to: - improper cuff position or attachment - weak or abnormal blood circulation - slow heart rate associated with artifacts - Patient is moving or disturbed during measurement - small air leakage
Artifacts	Unsuccessful NIBP because of patient: - movements - shivering - deep breathing - marked arrhythmia or irregular beats Calm down the patient and start a new measurement.

Table 10-9 NIBP Messages 2

NIBP	
MESSAGE	**EXPLANATION**
Cuff overpressure	Cuff is squeezed during measurement and pressure safety limits are exceeded
Unable to measure Sys	Initial inflation pressure is not high enough to enable proper measurement. Systolic pressure probably higher than maximum inflation pressure or artifacts interfere in the systolic area.
Unable to measure Dia	Accurate diastolic pressure difficult to measure because of artifacts, weak pulsation etc.
Unstable zero pressure	Pressure is unstable at start of the measurement. Calm down the patient and retry.
Infl. limits! Check setup	Adult or child cuff is used but the selected infant mode restricts the inflation pressure too low.
Long measurement time	Measurement is prolonged over the max. measurement time, 2 min. in adult or child mode or 1 min. in infant mode. Calm down the patient and start a new measurement. Try also reapplying the cuff.
Wait for the measure ment to be done	When venous stasis is attempted while a regular measurement is underway.
Control measurement	The pressure alarm limit has been violated and a new measurement is automatically started to checkthe blood pressure.
Call service Error XX	NIBP hardware errors. Replace NIBP module and notify service personnel.
Calibration switch ON	The calibration protection switch at the bottom of the module has been turned to the right. Call service to check the NIBP module calibrated.
Calibration not protected	Replace module and call service to check it.

Table 10-10 Airway Gas Messages 1

AIRWAY GAS	
MESSAGE	**EXPLANATION**
Resp High Resp Low	Respiration rate equal or above alarm limit Respiration rate equal or below alarm limit
EtCO2 High EtCO2 Low	EtCO2 equal or above alarm limit EtCO2 equal or below alarm limit
Rebreathing	FiCO2 equal or above alarm limit
Apnea	No changes detected in CO2 during the last 20 seconds
FiO2 High FiO2 Low	FiO2 equal or above alarm limit FiO2 equal or below alarm limit
EtO2 High EtO2 Low	EtO2 equal or above alarm limit EtO2 equal or below alarm limit
FiN2O High	FiN2O equal or above 82 %
FiAA High FiAA Low	FiAA equal or above alarm limit FiAA equal or below alarm limit
EtAA High EtAA Low	EtAA equal or above alarm limit EtAA equal or below alarm limit
Select Agent	Without agent identification: Anesthetic agent detected, not selected.
Select Agent + Agent Mixture	With agent identification: Anesthetic agent mixture detected.
Occlusion	The sample tube inside or outside the monitor is blocked or the water trap is occluded. If occlusion persists, measured gas values disappear.
Air Leak	- The water trap is not connected. - The gas outlet is blocked. - There is a leak in the sampling system inside the module. If air leak persists measured gas values disappear.

Table 10-11 Airway Gas Messages 2

AIRWAY GAS	
MESSAGE	**EXPLANATION**
Check Agent AA Detected	With agent identification: Manually selected agent differs from the one identified by the monitor.
Unknown Agent	The agent identification detects more than one agent.
Calibrate Agent ID	The selfdiagnostics detects identification error. Perform gas calibration.
Replace Trap	Indicates residue build-up on the water trap membrane. This decreases air flow.
Sensor Inop.	The gas measuring sensor is inoperative or the temperature in the module has increased.
Gas-Module error	

Table 10-12 Side Stream Spirometry Messages

SIDE STREAM SPIROMETRY	
MESSAGE	**EXPLANATION**
Obstruction	Peak pressure high, may indicate impaired air flow in the patient airway.
Disconnection	Disconnection in the patient's airway.
Leak	Peak pressure or expiratory minute volume low, indicates leak in the airway.
Ppeak high/low	Measured peak pressure value above/below the set pressure limit.
PEEP high/low	Measured PEEP value above/below the set pressure limit.
MVexp high/low	Measured expiratory minute volume value above/below the set volume limit.

Others

Below is listed some additional help for situations that may occur during monitoring.

Table 10-13 Other Problem Situations 1

PROBLEM	EXPLANATION
Noisy ECG	- patient is shivering - incorrect ECG filter - electrode quality or positioning
Thick ECG baseline	- ECG lead cable is looped - other electrical power cables are near the ECG wires - incorrect ECG filter - incorrect power frequency of the monitor
Extra Asystole alarms	- electrode quality or positioning - remove the ECG cable from the module and insert again. - enlarge the size from 1.0mV to 2.0mV
Pacermarkers are not visible	- the pacermarkers have been selected ON - the pacemaker has been adjusted correctly and not above R - the pacemaker functions correctly - ECG cables, electrodes and setups are correct
High pressure readings	- resonating waveform caused by air bubbles or a swinging catheter - wrong zero because the transducer position in relation to the patient has changed (too low) - transducer failure - incorrect calibration
Low pressure readings	- dampened waveform because of air bubbles, clotting or kinked tubes - transducer is positioned above patients mid-heart level - transducer failure - incorrect calibration

Table 10-14 Other Problem Situations 2

PROBLEM	EXPLANATION
NIBP readings are high	- too small cuff - loose cuff - cuff is under mid-heart level
SSS values are 1/4 of real values	An ADULT sensor is used for an ADULT patient but the the sensor type selection of the monitor is PAEDIATRIC
SSS values are 4 times larger than real values	A PAEDIATRIC sensor is used for a PAEDIATRIC patient but the sensor type selection of the monitor is ADULT
Vertical Paw-Vol loop	A PAEDIATRIC sensor is used for an ADULT patient and the sensor type selection of the monitor is PAEDIATRIC
Poor accuracy, TV less than 50 ml reported as 0 ml	An ADULT sensor is used for an PAEDIATRIC patient and the sensor type selection of the monitor is PAEDIATRIC

Datex

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11 ECG

Overview

ECG reflects the electrical activity generated by the heart muscle. ECG monitoring is used for heart rate measurement, to detect arrhythmias, pacemaker function, and myocardial ischaemia.

Using a 5-leadwire ECG cable, you may simultaneously monitor the waveforms of up to three different ECG leads (ECG1, ECG2, ECG3). If a 3-lead cable is used, only one ECG lead (ECG1) will be displayed.

The monitor also analyzes ST segment changes simultaneously of three monitored ECG leads.

NOTE: The number of ECG waveforms to be displayed is determined by configuring the screen in the Monitor Setup menu and selecting Modify Waveforms. ECG leads are selected in the ECG menu.

Display of ECG and HR (heart rate)

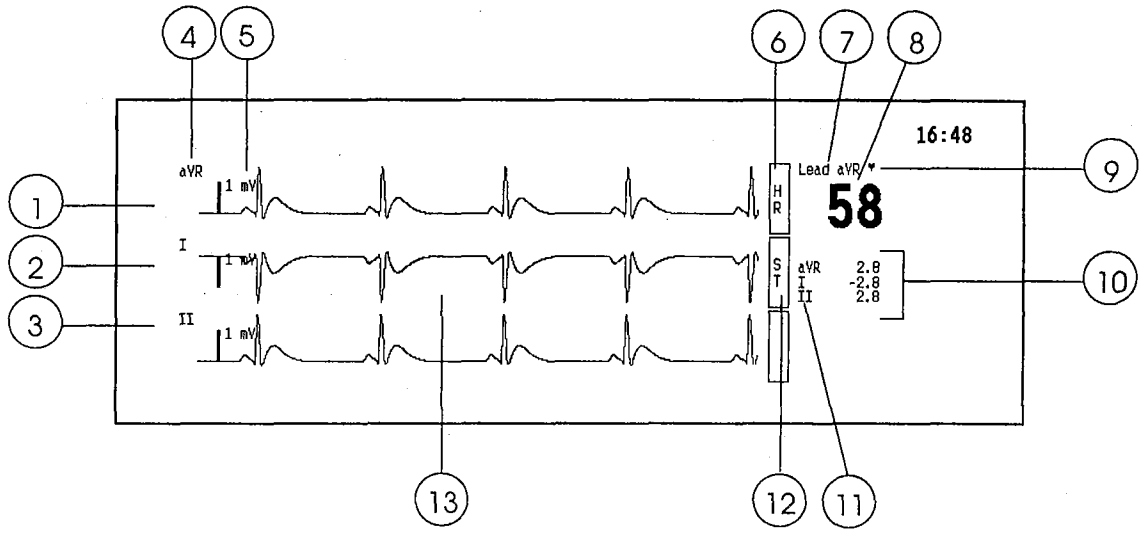


Figure 11-1 Display of ECG and HR

(1) ECG1
(2) ECG2
(3) ECG3
(4) Selected lead label
(5) ECG gain bar (1 mV reference)
(6) Heart rate (HR) label
(7) Heart rate calculation source and message field for HR messages
(8) HR value is always displayed with ECG1
(9) Heart beat detector is flashing with every detected heart beat
(10) ST values are always displayed next to ECG1
(11) Selected ST leads
(12) ST label
(13) Message field for parameter messages

Module Description

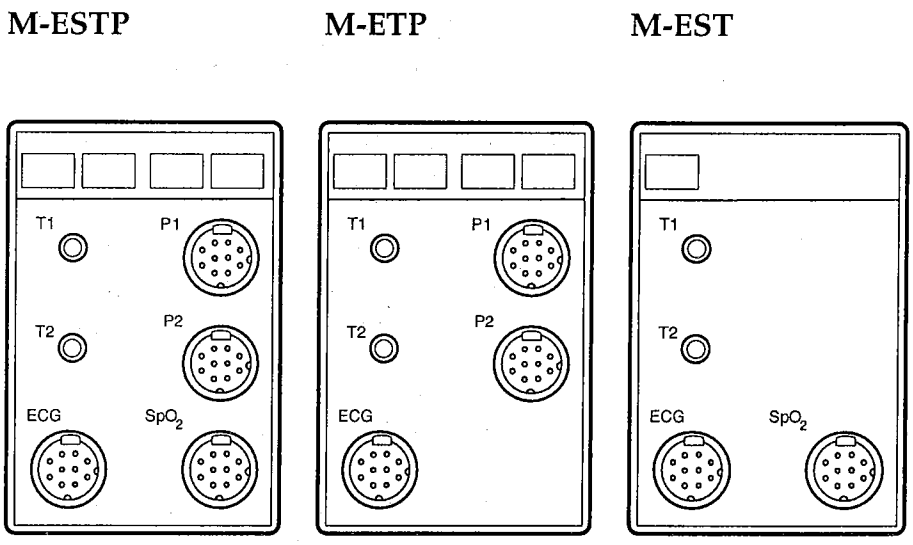


Figure 11-2 Modules for Electrocardiographic (ECG) Measurement: M-ESTP, M-ETP and M-EST

NOTE: Do not use identical modules in the same monitoring system simultaneously. The M-ESTP, M-EST and M-ETP are considered as identical modules.

Module Key

The module key changes the ECG lead from one lead to the next.

Start Up

* Check that a module containing ECG is plugged in.

* Check visually that the ECG cable set is not damaged. Replace with new if damage of the cable set is suspected.

* Connect the patient cable to the blue ECG connector in the module.

* Place the electrodes on the patient. Connect the leadwires to the electrodes. Make sure that the electrodes don't touch any electrically conductive material.

* Press the ECG LEAD key on the module to change the ECG1 (first ECG lead) if necessary.

  The label of the lead is displayed in the ECG field and above the HR numerics.

* If ECG2 (second ECG lead) or ECG3 (third ECG lead) is to be changed, press the ECG key on the Command Board and make the change using the ECG menu.

Selecting ECG Lead

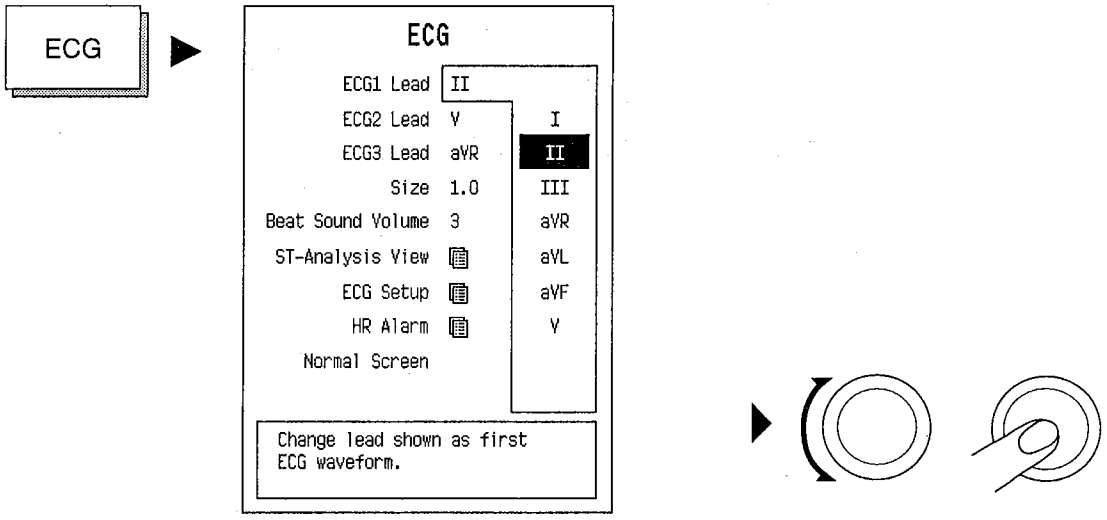
The following lead selections are possible:

* 3-lead cable: I, II, III
* 5-lead cable: I, II, III, aVR, aVL, aVF and V

To select ECG1 lead:

* Press the ECG LEAD key on the module. This changes ECG1 lead immediately to the next alternative. The label of the selected lead is displayed in the ECG waveform field.

All leads (ECG1, ECG2 and ECG3) can be selected in the ECG menu.



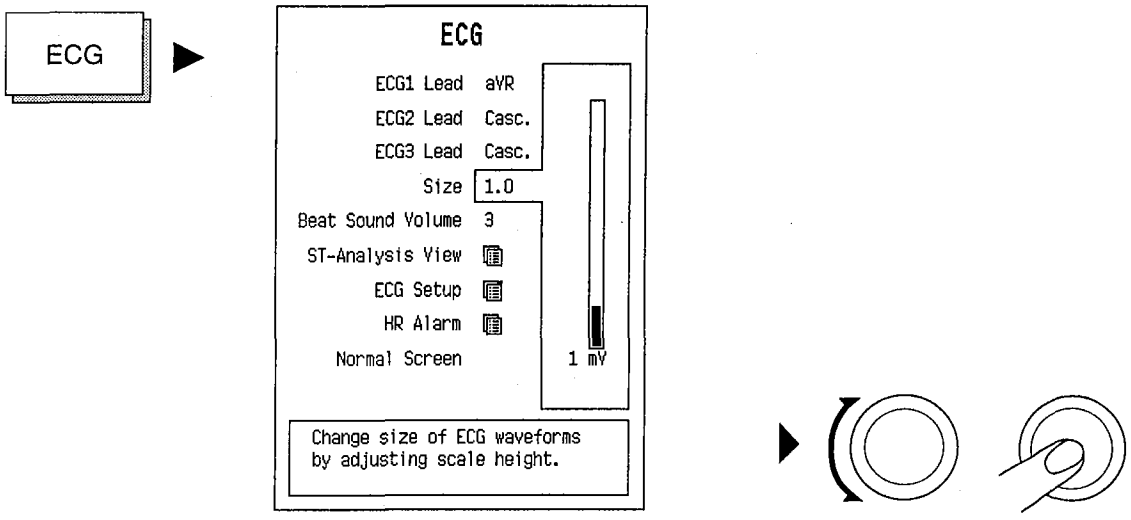
NOTE: 5-leadwire cable cannot be used as a 3-leadwire cable.

Cascaded ECG

If there is more than one ECG waveform configured to the waveform fields and a 3-leadwire cable is used, the same ECG will be displayed in each of these fields. Thus more QRS complexes are displayed at the same time. With a 5-leadwire cable either a cascaded ECG or different leads can be selected in the ECG menu.

Adjusting ECG Size

Increasing or decreasing the ECG gain affects the size of the 1 mV bar at the left end of the ECG waveform and the size of the ECG waveform accordingly.

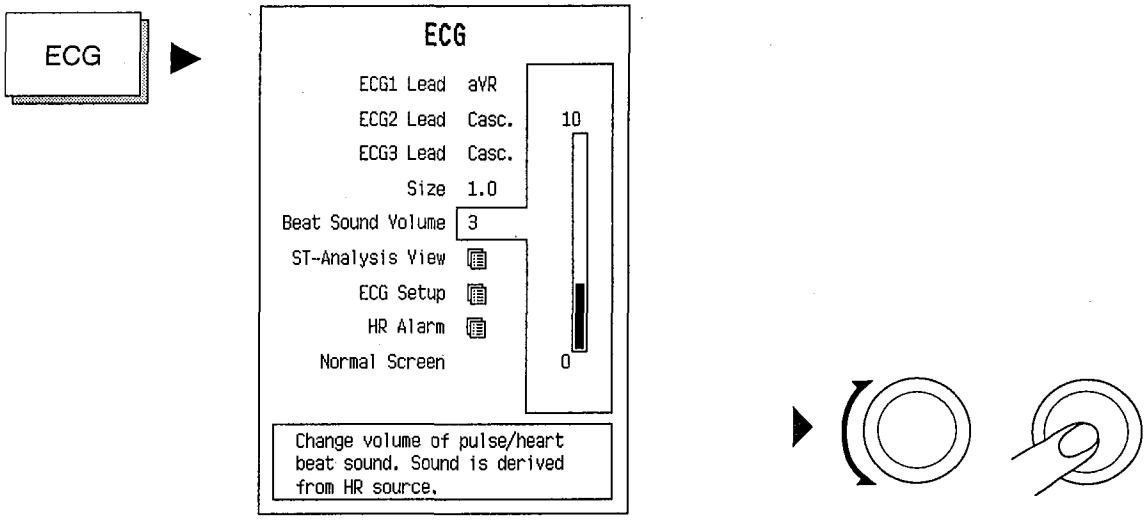


Adjusting Beat Sound Volume

When the monitor has detected a QRS complex or a pleth or pressure pulse, a beep tone is produced. The beat volume is adjustable. The volume can be raised, lowered, or turned off. The range is 1 (minimum) to 10 (maximum) or 0 (OFF).

Adjusting beat sound volume affects also the beat sound volume of SpO_2.

When SpO_2 is monitored, the monitor provides a variable pulse beep, so that the tone of the pulse beep will rise with increasing oxygen saturation and fall as saturation decreases. This affects also the ECG tone.



ST Segment Analysis

Overview

Myocardial ischaemia manifests itself in the ECG by causing the ST segment to deviate from the isoelectric line (ISO point). ST segment is generally elevated above the PQ isoelectric line in the presence of transmural ischaemia and is depressed below the isoelectric line in subendocardial ischaemia.

Ischaemic heart disease may result in myocardial infraction, fatal arrhythmias or acute coronary insufficiency.

Monitoring ST Segment

The monitor analyzes the ST segment changes continuously in ECG1, ECG2, and ECG3. ST numerical data is shown to the right of the second real-time ECG waveform field. It is also possible to select ST numerical data to the lower digit field. See the Monitor Setup menu Modifying the Digit Fields.

When monitoring begins or when a lead is changed the monitor starts to learn ST segment. During a learning period of 16 accepted beats the ST values are displayed beat to beat.

NOTE: Select ST filter (in the ECG Setup menu) as well as the monitored leads (in the ECG menu) at the beginning of the case. Changing of the filter and/or the lead affects the measurement of ST values.

Display of ST

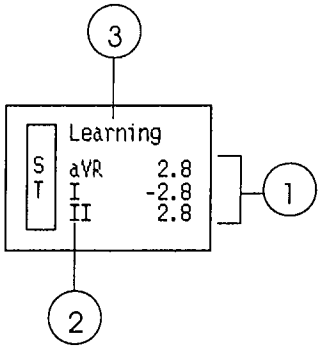
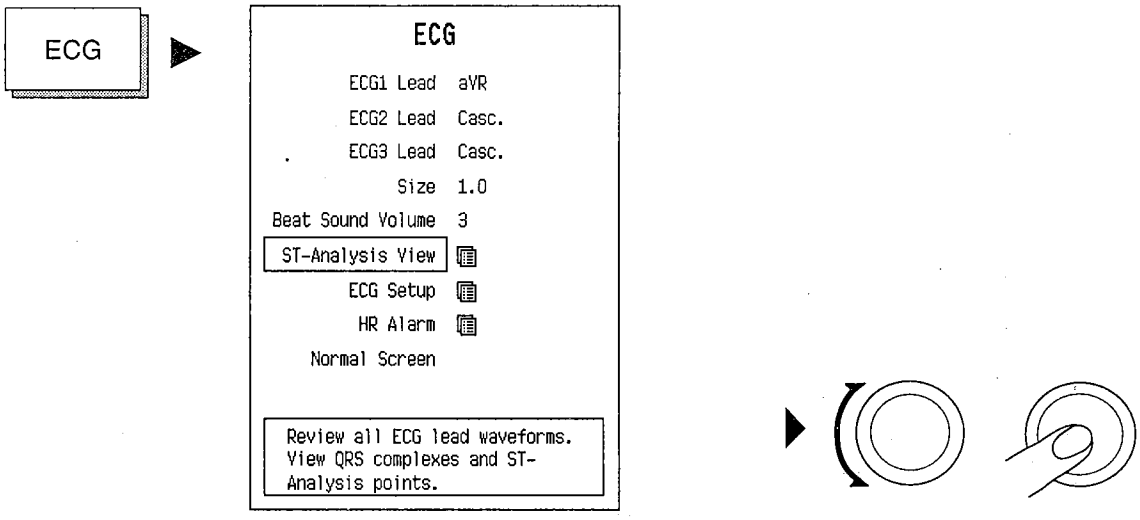


Figure 11-3 ST Number Field

(1) ST values of ECG1, ECG2, and ECG3
(2) Lead label
(3) Message field

Accessing ST-Analysis View



When the ST-analysis view is accessed, a display showing three measured ECG leads and an averaged QRS complex for each ECG lead appears. In addition, a graphic trend display for each ECG lead is shown. Changing the lead will cause a new learning of the ST segment. The learning period is shown as a gap in the trend display.

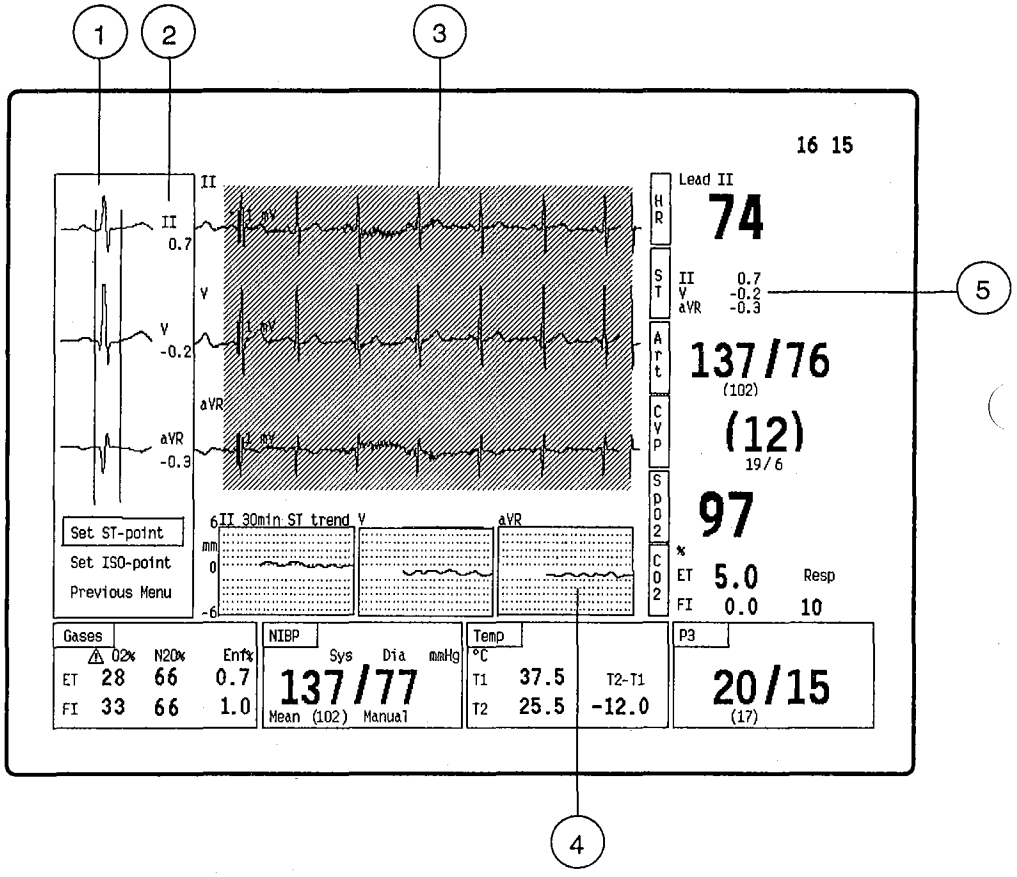


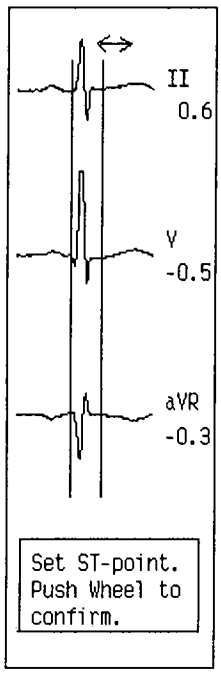
Figure 11-4 ST View

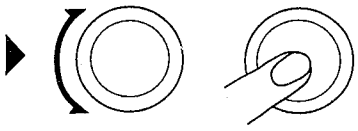
(1) ST view showing an averaged QRS complex for each lead with ST and ISO point cursors
(2) Lead label, ST values
(3) ECG waveform area showing 3 ECG leads
(4) A trend of ST values of each selected lead

Manually Setting ST Point

The ST point is initially set 80 ms after the R detection. If this setting is changed, the original point is shown as a dashed line.

To manually set the point:



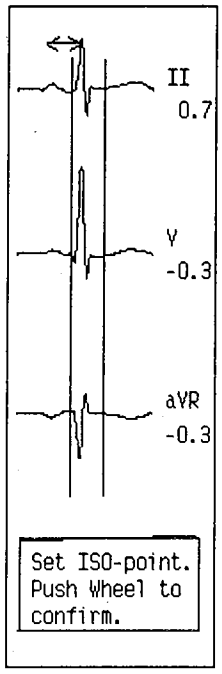


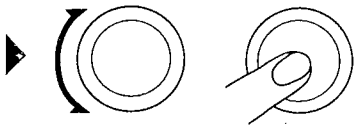
NOTE: If the ST point is manually set, the set value will remain until the monitor is turned off or reset.

Manually Setting ISO Point

The ISO (isoelectric) point is initially set 74 ms before the R detection. If this setting is changed, the original point is shown as a dashed line.

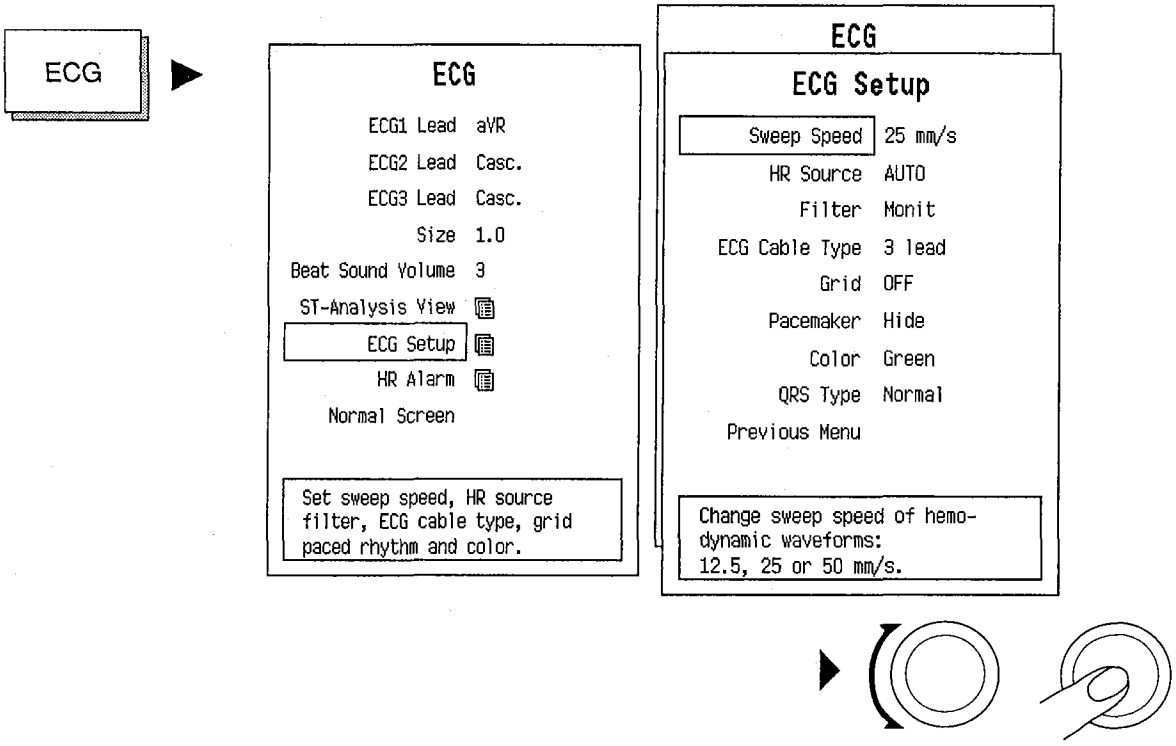
To manually set the point:





NOTE: If the ISO point is manually set, the set value will remain until the monitor is turned off.

ECG Setups and Adjustments



SWEEP SPEED

Sets the speed of the display sweep for the waveform display. The available speeds are: 12.5, 25, and 50 mm/s on a 14" screen.

The 12.5 mm/sec speed is suggested for monitoring patients with a slow HR to show more QRS complexes per sweep.

The 50 mm/sec speed is recommended when monitoring patients with a high HR or when using cascaded ECG.

NOTE: The sweep speed is the same for all hemodynamic waveforms and the plethysmographic pulse wave.

HR SOURCE

Selects the heart rate source. When ECG is selected the HR source is always calculated from ECG 1. If the ECG signal is affected by too much noise for a reliable heart rate calculation, heart rate can be calculated from PRESSURE (Art) or PLETHYSMOGRAPHIC PULSE waveform. The selected heart rate source is shown above the numerical display of the heart rate. The color of the heart rate is the same as the source parameter.

The AUTO selection priorities for heart rate calculation are: ECG, Pressure (Art), Plethysmographic pulse waveform. The first heart rate source available is selected.

FILTER

Filters the ECG signal high frequency noise and slow respiratory artifacts.

MONITOR (Monit) filter is used in routine monitoring. It effectively filters the artifacts caused by the electrosurgery unit and respiration.

DIAGNOSTIC (Diagn) filter is used if more accurate information of the waveform is needed (e.g., of P-wave or AV block). The diagnostic filter is more susceptible to both high frequencies and baseline wander than monitor filter.

ST FILTER (STfilt) permits more accurate information of ST segment. It filters the high frequency artifacts caused by electrosurgery unit but catches the slow changes in ST segment. The ST filter is more susceptible to baseline wander than the monitor filter.

ECG CABLE TYPE

Selects 3- or 5-leadwire cable. With Datex 5-leadwire cable the right lead will be selected automatically. If an older Datex 5-leadwire cable is used, 5-lead connection must be selected from this menu.

GRID

Selects a background to be shown on the ECG waveforms, making it easier to evaluate the waveform. Scale of the grid is 0.5 mV.

PACEMAKER

If you have a patient with a cardiac pacemaker you can select the pacing pulse to be seen as a constant height marker. The selections are Show, Hide or ON R.

ON R selection is intended for cases where inaccurate pacer adjustment may otherwise result in unnecessary asystole alarms. ON R selection may be necessary especially with AV pacemakers in demand mode. During HR calculation the pacer is not compensated from the QRS and will thus allow for QRS detection despite pacemaker pulses.

COLOR

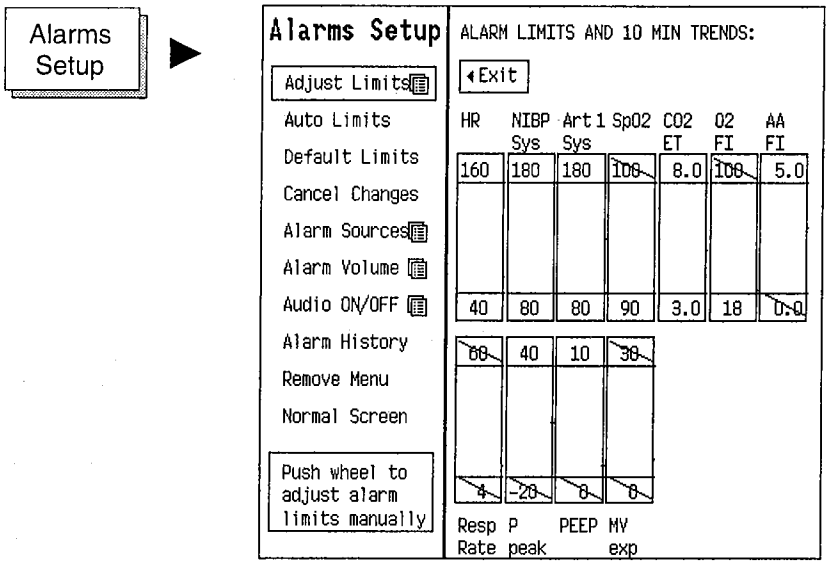
This feature allows you to change colors for all ECG waveforms: YELLOW, WHITE, GREEN, RED, or BLUE. HR is displayed with the same color as HR source waveform.

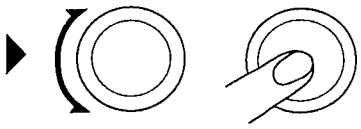
QRS TYPE

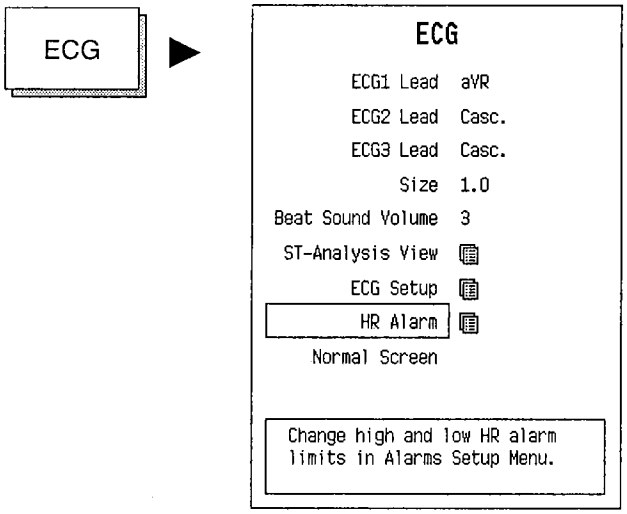
QRS detection and HR calculation may be affected by the shape of the QRS complex. Normal QRS type detects a heart beat between 40 and 120 ms. Wide QRS type detects a beat between 40 and 220 ms.

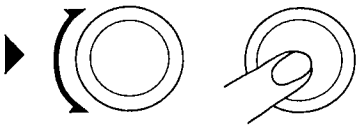
Setting Heart Rate Alarms

Heart rate alarms can be adjusted in the Alarms Setup menu or accessed through the ECG menu. See more detailed instructions in Chapter Alarms, Section Alarms Setup and Adjustments.









Alarm Messages and Limits

Table 11-1 ECG Messages

ECG	
MESSAGE	**EXPLANATION**
ASYSTOLE	Asystole, no QRS detected in ECG. This does not depend on heart rate source.
HR high	HR equal or above upper alarm limit.
HR low	HR equal or below lower alarm limit.
LEADS OFF	Cable disconnections. ECG cable, all leads or neutral electrode (RL/N) are off.
NOISE	Unreliable HR calculation or distorted waveform due to: too much high frequency or electrical mains noise in ECG the DC offset voltage between two electrodes is too high.

Alarm Limits

Heart rate adjustable 30 - 250 beats/min

Auto Limits

HR HIGH = HR x 1.25 + 10
HR LOW = HR x 0.75 - 10

Pacemaker Markers

The Datex AS/3 Anesthesia Monitor uses automatic pacemaker pulse detection and rejection circuits. When a patient with a cardiac pacemaker is monitored you may select paced rhythm Show, Hide or ON R in the ECG Setup menu.

When Show is selected, the pacing pulse is seen as a constant height marker. ON R selection will also show a pacer marker but will not compensate the pacer pulse from the QRS. In ON R mode the HR calculation is not affected if the pacer pulse is by mistake timed on the QRS.

NOTE: The shape of QRS complex may be changed because of the pacemaker so much that QRS detection may be affected.

WARNING: PACEMAKER PATIENTS: Rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest, some arrhythmias, or with certain types of pacemakers particularly in ON R mode. Do not rely entirely upon rate meter alarms. Keep pacemaker patients under close surveillance.

Patient Connections

Patient Preparation

Good signal quality depends on good skin contact with the electrodes. Excessive body hair or skin oil can affect the contact. Pregelled electrodes are recommended. Check, that the electrodes are moist and have not dried out during storage.

Placing Electrodes

Avoid bones close to the skin, obvious layers of fat and major muscles.

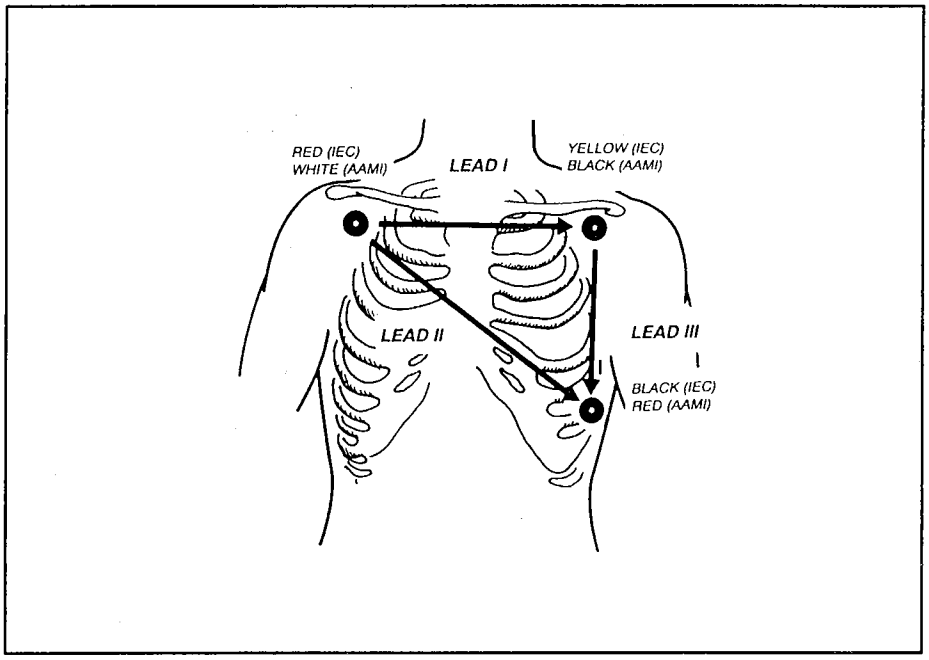


Figure 11-5 Electrode Positioning for Routine 3-Lead ECG

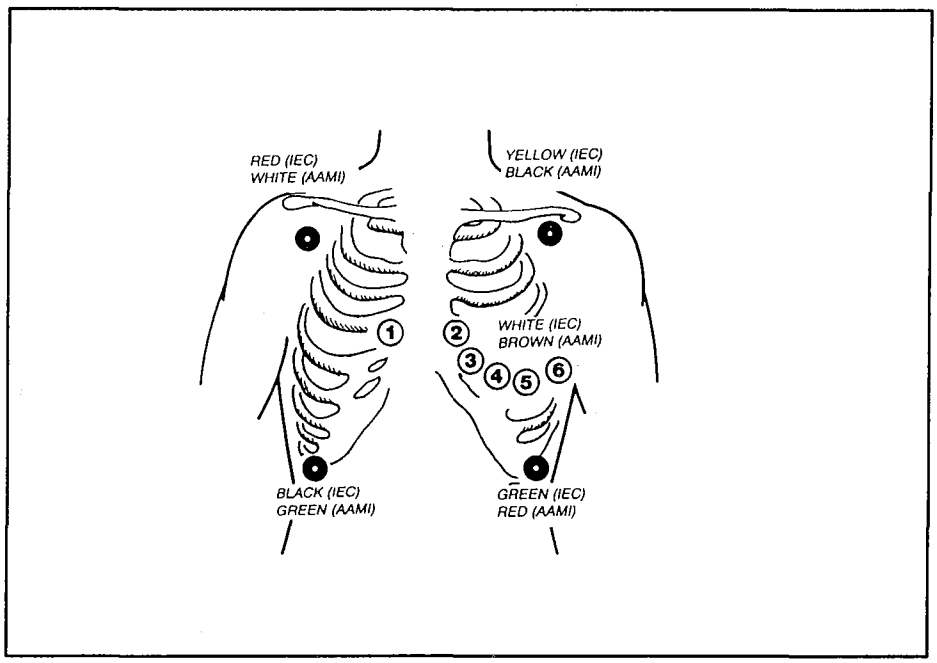


Figure 11-6 CB_5 Modified 3-lead ECG

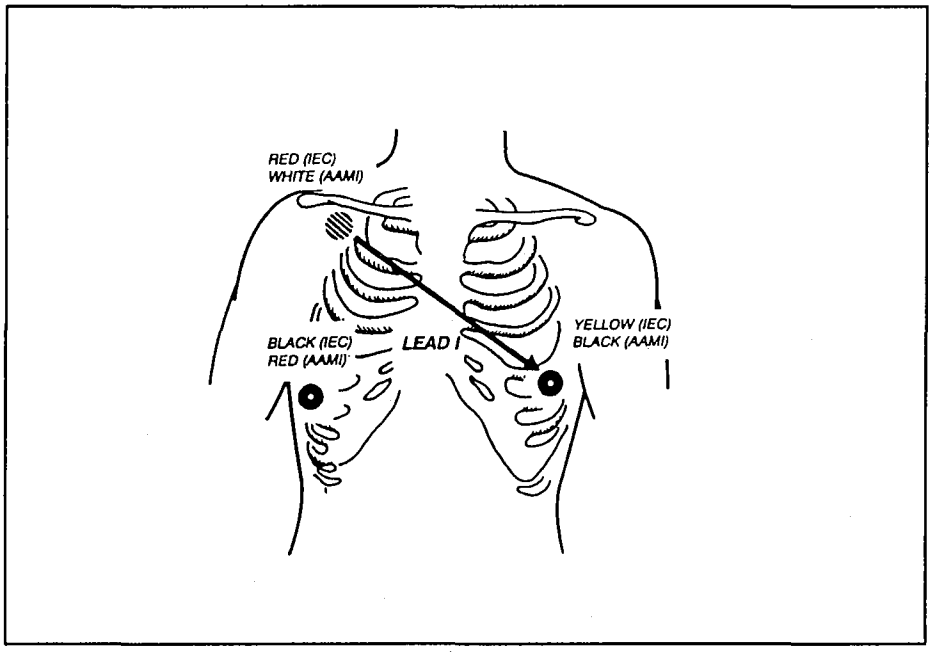


Figure 11-7 Electrode Positioning for Routine 5-Lead ECG

Color and Letter Coding

Table 11-2 IEC Standard Lead Coloring

3-LEAD IEC STANDARD	5-LEAD IEC STANDARD
L = yellow (left arm) N = black (neutral) R = red (right arm)	R = red (right arm) N = black (neutral) L = yellow (left arm) F = green (foot) C = white (chest)

Table 11-3 AAMI Standard Lead Coloring

3-LEAD AAMI STANDARD	5-LEAD AAMI STANDARD
LA = black LL = red RA = white	RA = white RL = green LA = black LL = red V = brown

WARNING: PATIENT SAFETY: Ensure proper contact of the return electrode of the electrosurgery unit to avoid possible burns on the patient via ECG electrodes and probes.

Analog Signal Output

The ECG1 output signal is transmitted from the Pressure Temp Module M-PT. The M-PT module should be used only together with modules M-ESTP-00-02, M-ETP-00-01 and M-EST-00-01 or later revisions.

WARNING: The output signals are not floating and they must not be connected directly to a patient.

Technical specifications are described in the System description chapter. For more information refer to the AS/3 Anesthesia Monitor' Service Manual.

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12 DATEX PULSE OXIMETRY

Overview

Oxygen saturation SpO_2, expressed as a percentage, defines the amount of oxygen carried compared to total capacity (also called functional or in vivo oxygen saturation). It is measured by two wavelength pulse oximeter.

The SpO_2 value is measured by light absorption technique: Red and infrared light (660 nm and 900 nm) is emitted from the emitter side of the sensor. The light is partly absorbed when it passes through the monitored tissue. The amount of transmitted light is detected in the detector side of the sensor. When the pulsative part of the light signal is examined, the amount of light absorbed by arterial hemoglobins is discovered and the saturation level can be calculated.

The plethysmographic pulse wave is derived from variations of the intensity of the transmitted light and reflects the blood pulsation at the measuring site. Thus the amplitude of the waveform reflects the perfusion.

Display of Pulse Oximetry

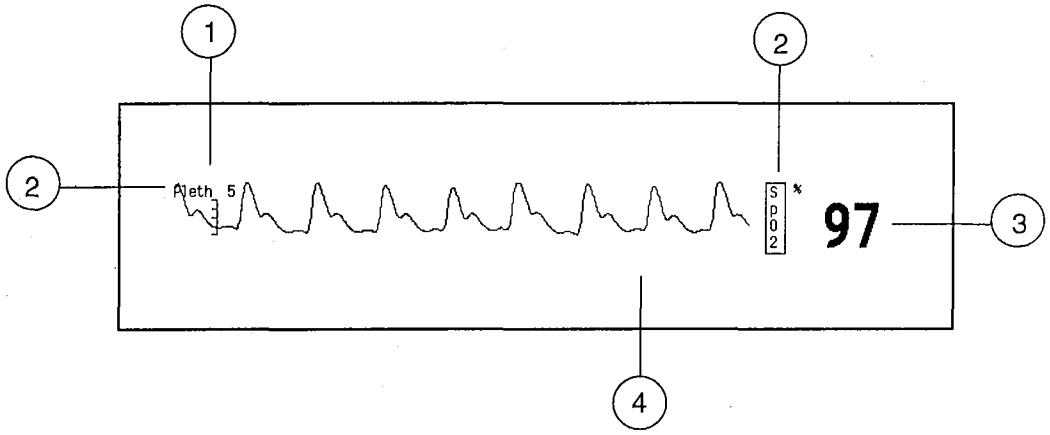


Figure 12-1 Pulse Oximetry Display

(1) Scale of Plethysmogram
(2) Label
(3) Oxygen saturation (SpO_2) value
(4) Pulse Oximetry message field

Module Description

M-ESTP **M-EST**

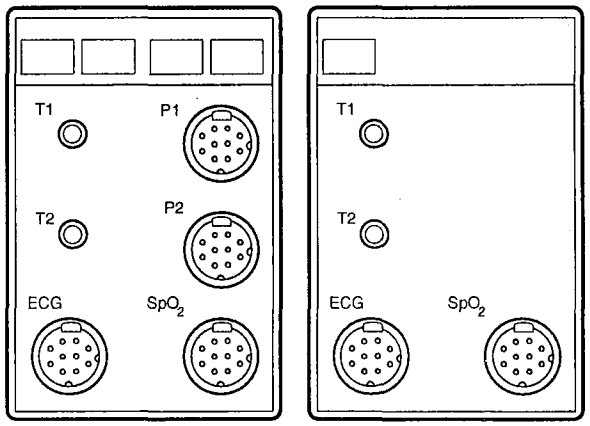


Figure 12-2 Pulse Oximetry Modules M-ESTP and M-EST

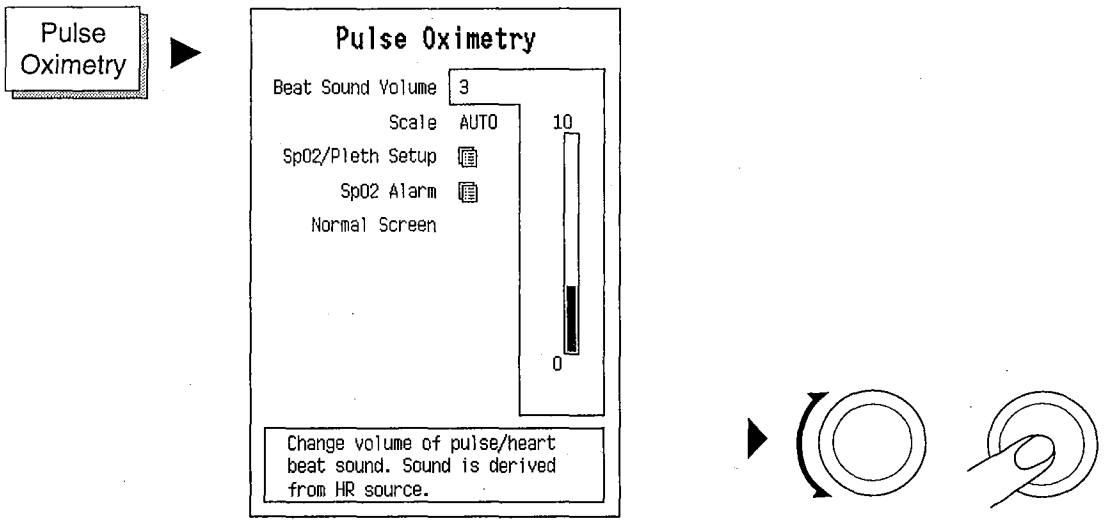
NOTE: Do not use two modules with SpO_2 measurement in the same monitoring system simultaneously.

Start Up

* Check that the module containing pulse oximetry is plugged in.
* Connect the sensor to the grey connector in the module.
* Attach the pulse oximetry sensor to the patient.

A message PULSE SEARCH appears on the message field. After the pulse search is completed the plethysmographic pulse waveform and the SpO_2 reading appear on the screen.

Adjusting Beat Sound Volume

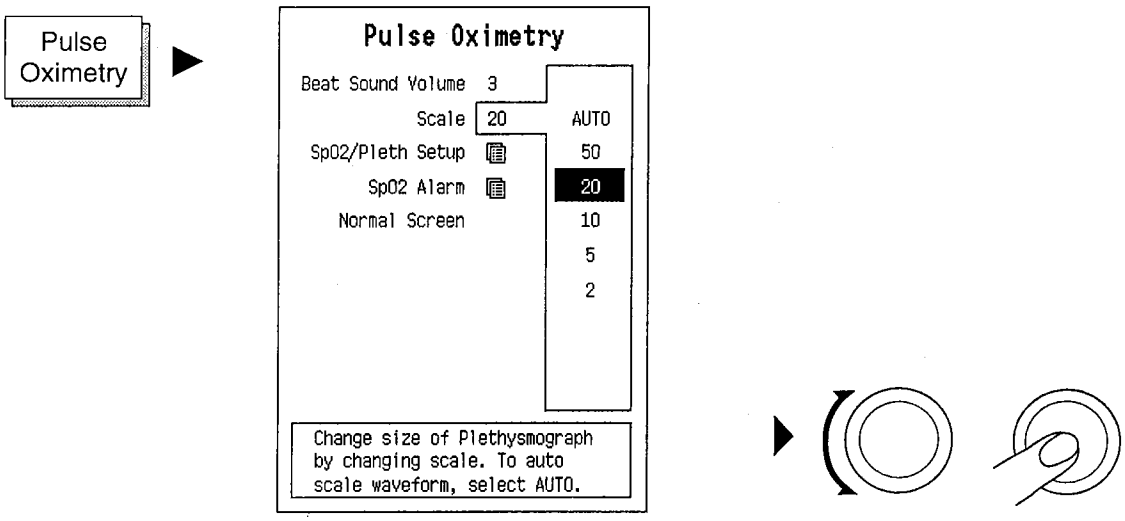


Adjusting of beat sound volume of SpO_2 also affects the beat sound volume of ECG.

When SpO_2 is monitored, the monitor provides a variable pulse beep, so that the tone of the pulse beep will rise with increasing oxygen saturation and fall as saturation decreases.

Selecting Plethysmographic Scale

The plethysmographic scale enables you to make adjustments in the Pleth display to monitor perfusion. The scale is set automatically during PULSE SEARCH. To adjust it further the following scales can be selected: 2, 5, 10, 20, 50, Auto.



When using sites that have poor perfusion, it is recommended, that you use smaller scale indicators in order to display an optimal pulse wave on the video screen. Small blood pulsations are a sign of impaired circulation and that may require increased attention.

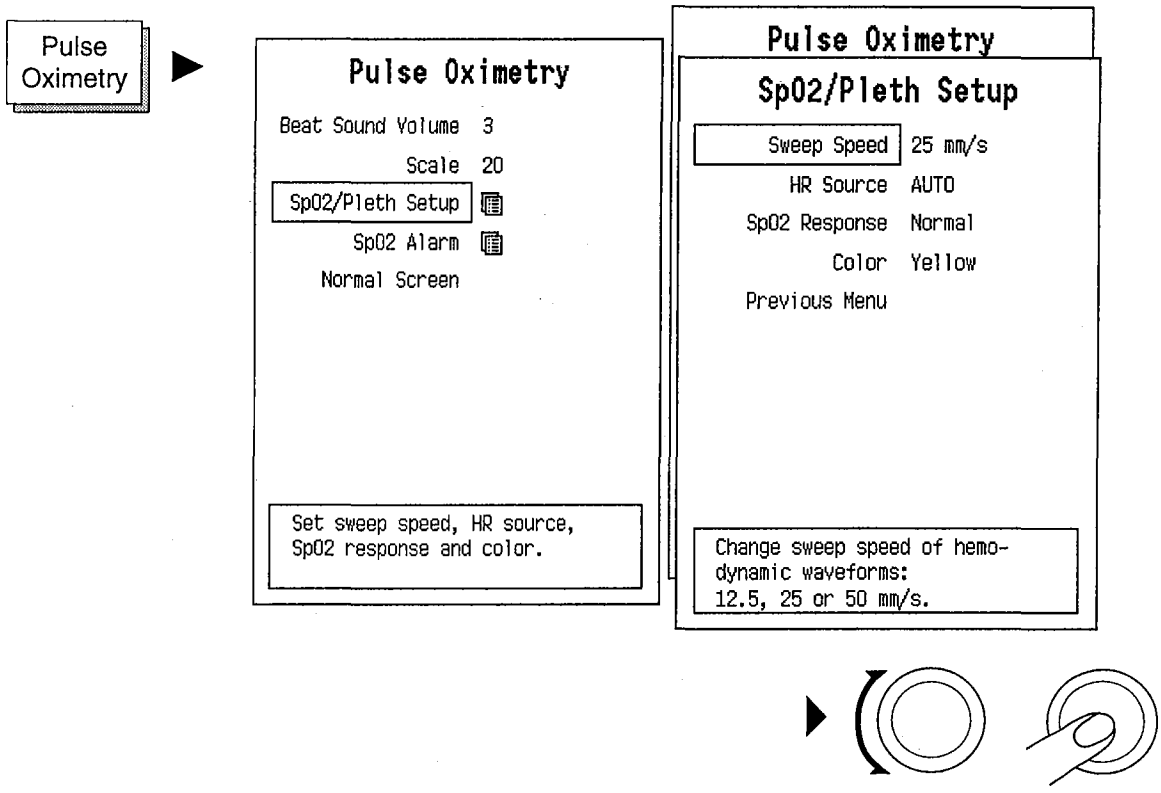
Higher scale indicators together with a well defined pulse wave indicate strong circulation and a relaxed patient.

When automatic (Auto) scaling mode is used, the scale number is automatically changed to a different scale if the amplitude of the pleth waveform has either exceeded the current scale or fallen below the maximum value of the next lower scale by 10 % for 30 seconds or more.

When the scale changes the message SCALE CHANGED is displayed. In the AUTO mode the displayed waveform has an amplitude as constant as possible.

The scale is displayed on the left side of the waveform.

SpO_2 and Plethysmographic Setup Adjustments



SWEEP SPEED

Sets the speed of the display sweep for the waveform display. The sweep speeds available are 12.5, 25, or 50 mm/sec on a 14" screen.

NOTE: The sweep speed is always the same for all the hemodynamic waveforms and the plethysmographic pulse wave.

HR SOURCE

Selects the heart rate source. If the ECG signal is affected by too much noise for a reliable heart rate calculation, heart rate can be calculated from PRESSURE (Art) or PLETHYSMOGRAPHIC PULSE waveform. The selected heart rate source is shown above the numerical display of the heart rate. The color of the heart rate is the same as the source parameter.

The AUTO selection priorities for heart rate calculation are: ECG (the lead with highest R-wave), Pressure (Art), and Plethysmographic pulse waveform.

SpO_2 RESPONSE

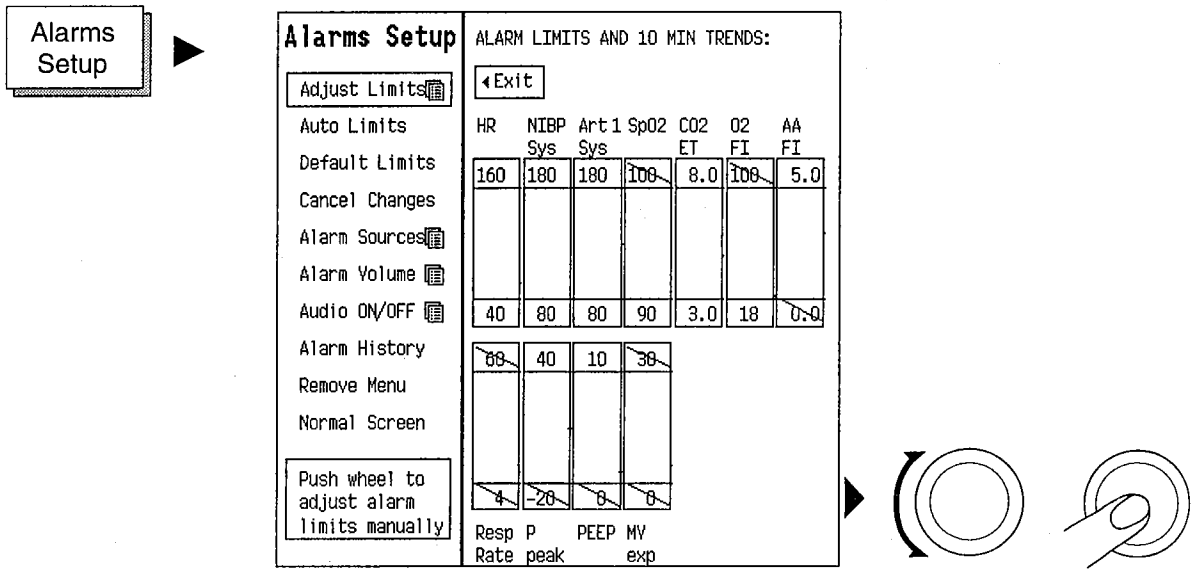
Selects SpO_2 averaging time. The selections are: beat-to-beat, normal: 10 seconds, slow: 20 seconds (default setting).

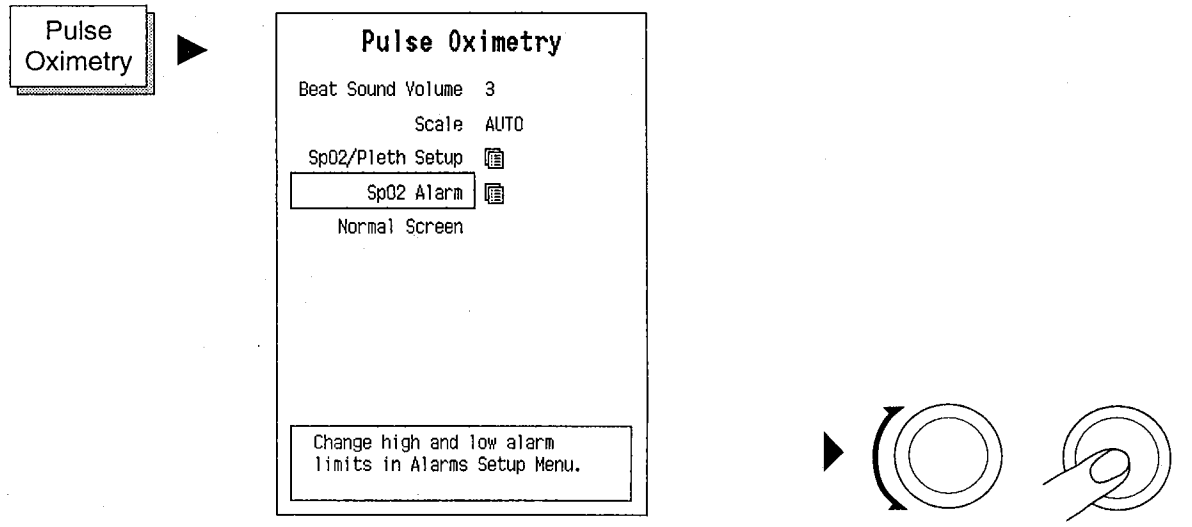
COLOR — This feature allows you to change color of the Pleth waveform. Your choices are: YELLOW, WHITE, GREEN, RED, or BLUE.

PREVIOUS MENU — Returns you to the previous menu level.

Setting SpO_2 Alarms

The alarms can be adjusted in the Alarms Setup menu or accessed through the Pulse Oximetry menu. See more detailed instructions in the Alarms Chapter to setup and/or adjust alarms.





Alarm Messages and Limits

Table 12-1 Pulse Oximetry Messages

PULSE OXIMETRY	
MESSAGE	**EXPLANATION**
SpO2 Low	SpO2 equal or below alarm limit.
SpO2 High	SpO2 equal or above alarm limit.
HR Low	Pulse rate equal or below alarm limit.
HR High	Pulse rate equal or above alarm limit.
No SpO2 pulse	Pulse signal is found and then lost for 10 seconds and longer.
No SpO2 probe	Sensor is not connected to the module.
SpO2 probe off	Sensor is not attached to the patient.
SpO2 Check Probe	Pulse search active for 20 seconds but no acceptable pulse is found. Either there is no detectable SpO2 signal, the sensor is faulty or it is detached from the patient.

Alarm Limits

SpO_2 adjustable 80 - 100 %, OFF

Auto Limits

SpO_2 HIGH	Not applicable
SpO_2 LOW	SpO_2 - 5 %

Sensor Attachment

Select the correct sensor type

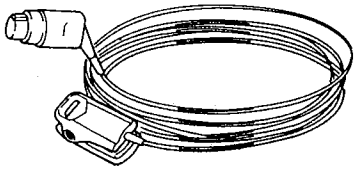
Datex FingerSat Sensors are recommended for short term patient monitoring with patients weighing more than 20 kg.

The EarSat sensors are recommended for active patients weighing more than 10 kg and patients with compromised peripheral circulation.

For long term patient monitoring, use either Datex Single Patient or Datex wrap type Sat Sensors.

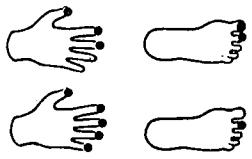
Choose the sensor site

FingerSat



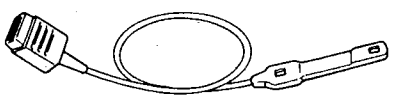
Pediatrics

Adults



EarSat

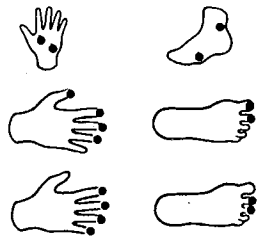
Flexalite Sensor



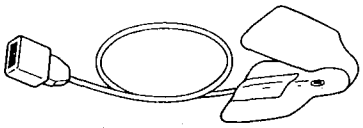
Infants

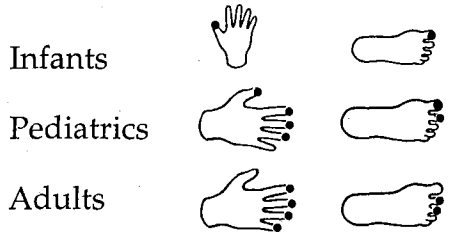
Pediatrics

Adults



Single Patient Sat Sensors





Attach the sensor to bare skin

Remove make-up, ear-rings, finger nail polish, artificial nails etc. from the measuring site.

Position the sensor correctly

For proper sensor positioning see the Instructions for Use accompanying each sensor.

Change the measuring site frequently

Patient condition or prolonged use may require changing the sensor site periodically. Check skin integrity, circulatory status and correct alignment and change sensor site at least every 4 hours for the FingerSat sensor and every hour for the EarSat sensor.

For patients with poor peripherical blood circulation, it is suggested to change the site at intervals of 30 minutes to one hour. To confirm the circulatory status, observe the size of the plethysmographic waveform. For reliability use a fixed pleth scale.

Special care should be taken when measuring infants.

NIBP measurement and cold infusions

It is recommended that the pulse oximetry sensor is not attached to a limb that is used for non-invasive blood pressure measurement or for administrating cold infusions. The above circumstances reduce the pulsation and perfusion and affect the pulse oximetry measurement.

To remove the sensor

Do not pull the sensor from it's cable.

Measuring Limitations

Electrosurgery

Datex monitors are designed to minimize the interference of electrosurgery. Under some circumstances electrosurgery may cause noise on the display. Therefore, be careful in interpreting the results, especially the plethysmographic pulse waveform, during electrosurgery.

Interfering Substances

Pulse oximeters are not able to distinguish between HbCO, MetHb, and HbO_2.

The saturation values may be somewhat higher for smokers. Special care should be taken with patients who have burns or carbon monoxide (CO) intoxication. When carbon monoxide intoxication is suspected, always confirm the pulse oximetry reading with a blood sample measurement.

Intravascular dyes may cause erroneous readings. For example, methylene blue, indigo carmine, indocyanine green or any substances that contain dyes, interfere with the SpO_2 measurement.

Vasoconstrictive drugs, such as phenylephrine hydrochloride and dopamine may affect the accuracy of the measurement.

Magnetic Resonance Imaging (MRI)

Datex strongly recommends not to use the Datex pulse oximeters with MRI procedures.

MRI procedures interfere with pulse oximeter measurement, and vice versa. However, each installation is different, one system may work perfectly while a supposedly identical system has serious interference problems.

* If possible, install the monitor outside the MRI chamber.
* Keep the sensor and sensor cable away from the scanned area, burns may result.
* Do not coil the sensor cable in the chamber.

NELLCOR COMPATIBLE SATURATION MEASUREMENT

Overview

Oxygen saturation SpO_2, expressed as a percentage, defines the amount of oxygen carried compared to total capacity (also called functional or in vivo oxygen saturation). It is measured by two wavelength pulse oximeter.

The SpO_2 value is measured by light absorption technique: Red and infrared light (660 nm and 920 nm) is emitted from the emitter side of the sensor. The light is partly absorbed when it passes through the monitored tissue. The amount of transmitted light is detected in the detector side of the sensor. When the pulsative part of the light signal is examined, the amount of light absorbed by arterial hemoglobins is discovered and the saturation level can be calculated.

The plethysmographic pulse wave is derived from variations of the intensity of the transmitted light and reflects the blood pulsation at the measuring site. Thus the amplitude of the waveform reflects the perfusion.

Display of Pulse Oximetry

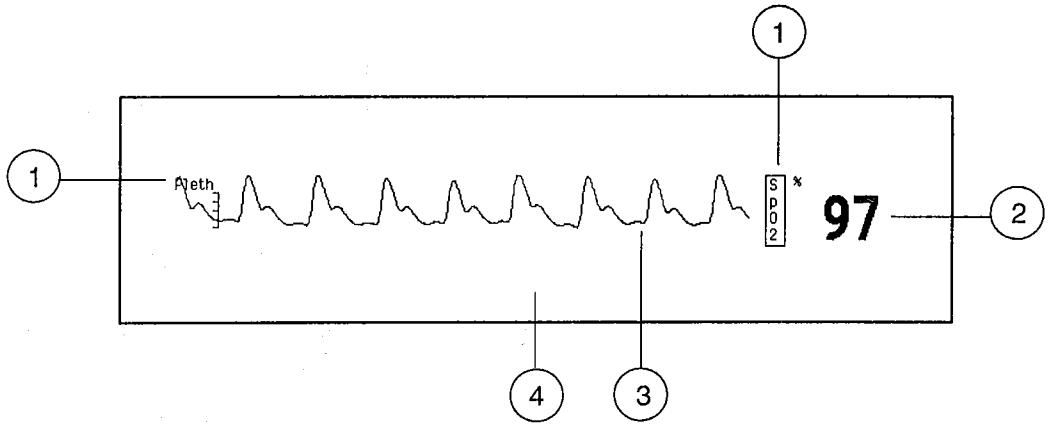


Figure 12-3 Pulse Oximetry Display

(1) Label
(2) Oxygen saturation (SpO_2) value
(3) Plethysmographic waveform
(4) Pulse Oximetry message field

Module Description

With the pulse oximetry module M-NSAT you can use Nellcor pulse oximetry sensors with your Datex AS/3 Anesthesia Monitor.

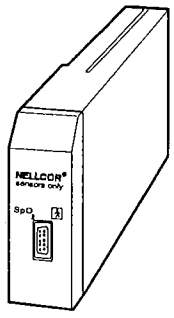


Figure 12-4 Nellcor Compatible Saturation Module M-NSAT

Start Up

* Check that the pulse oximetry module M-NSAT is plugged in.

* Connect the sensor to the D-connector recessed in the front of the module.

* Attach the pulse oximetry sensor to the patient.

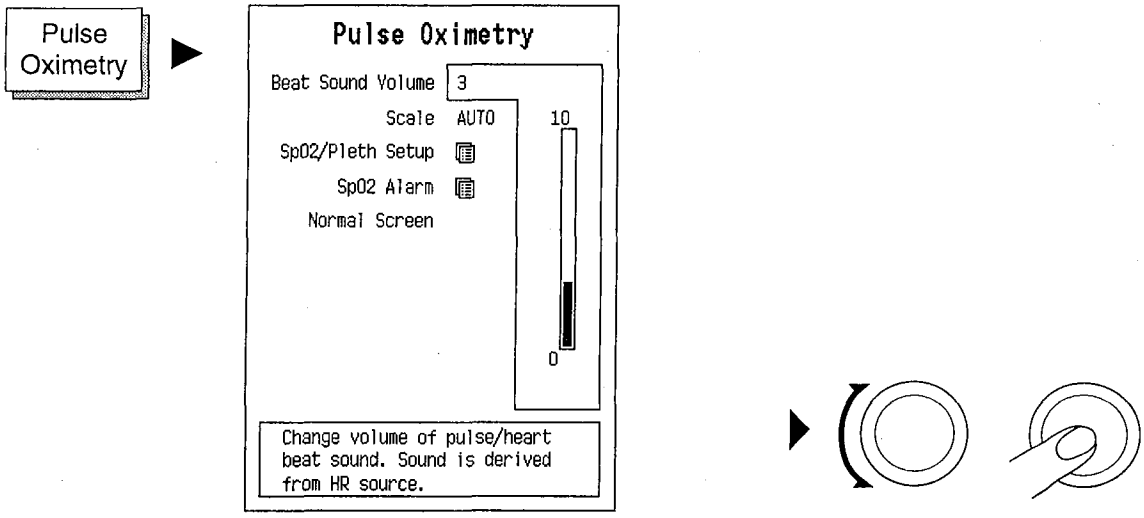
A message PULSE SEARCH appears on the message field. After the pulse search is completed the plethysmographic pulse waveform and the SpO_2 reading will appear on the screen.

WARNING: Use only Nellcor pulse oximetry sensors specified in this document. Datex sensors can not be used with M-NSAT module.

NOTE: Do not use identical modules in the same monitor simultaneously.

NOTE: If M-NSAT and M-ESTP/M-EST modules are plugged in the monitor frame simultaneously, then M-NSAT is automatically selected as the active SpO_2 source.

Adjusting Beat Sound Volume



Adjusting of beat sound volume of SpO_2 also affects the beat sound volume of ECG.

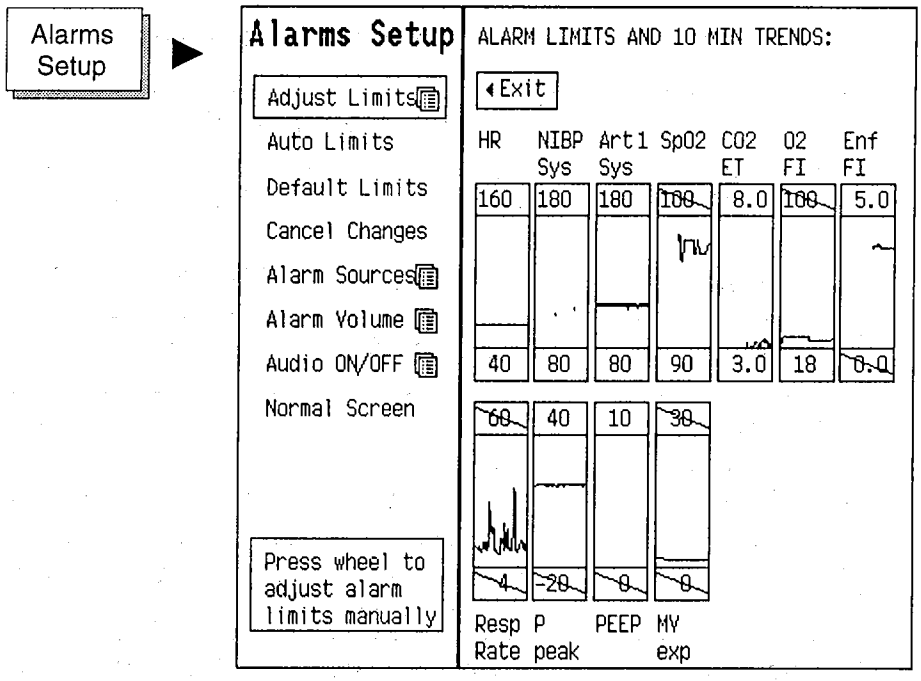
When SpO_2 is monitored, the monitor provides a variable pulse beep, so that the tone of the pulse beep will rise with increasing oxygen saturation and fall as saturation decreases.

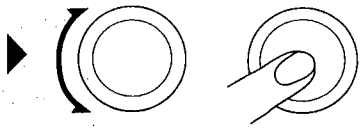
Plethysmographic Scale

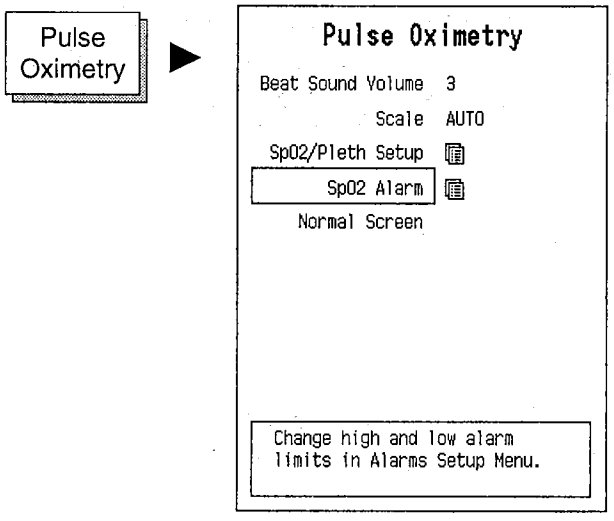
The plethysmographic wave is automatically scaled by the monitor. The scaling can not be adjusted by the user when using the M-NSAT module.

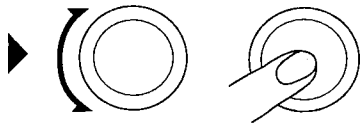
Setting SpO_2 Alarms

The alarms is can be adjusted in the Alarms Setup menu or accessed through the Pulse Oximetry menu. See more detailed instructions in the Alarms Chapter to setup and/or adjust alarms.


Alarms Setup
Alarms Setup
Adjust Limits
Auto Limits
Default Limits
Cancel Changes
Alarm Sources
Alarm Volume
Audio ON/OFF
Normal Screen
Press wheel to adjust alarm limits manually
ALARM LIMITS AND 10 MIN TRENDS:
Exit
HR
NIBP Sys
Art1 Sys
SpO2
CO2 ET
O2 FI
Enf FI
160
180
180
100
8.0
100
5.0
40
80
80
90
3.0
18
0.0
60
40
10
30
4
20
0
0
Resp Rate
P peak
PEEP
MV exp




Pulse Oximetry
Pulse Oximetry
Beat Sound Volume 3
Scale AUTO
SpO2/Pleth Setup
SpO2 Alarm
Normal Screen
Change high and low alarm limits in Alarms Setup Menu.



Alarm Messages and Limits

Table 12-2 Pulse Oximetry Messages Nellcor

PULSE OXIMETRY	
MESSAGE	**EXPLANATION**
SpO2 Low	SpO2 equal or below alarm limit.
SpO2 High	SpO2 equal or above alarm limit.
HR Low	Pulse rate equal or below alarm limit.
HR High	Pulse rate equal or above alarm limit.
No SpO2 pulse	Pulse signal is found and then lost for 10 seconds and longer.
No SpO2 probe	Sensor is not connected to the module.
SpO2 probe off	Sensor is not attached to the patient.
SpO2 Check Probe	Pulse search active for 20 seconds but no acceptable pulse is found. Either there is no detectable SpO2 signal, the sensor is faulty or it is detached from the patient.

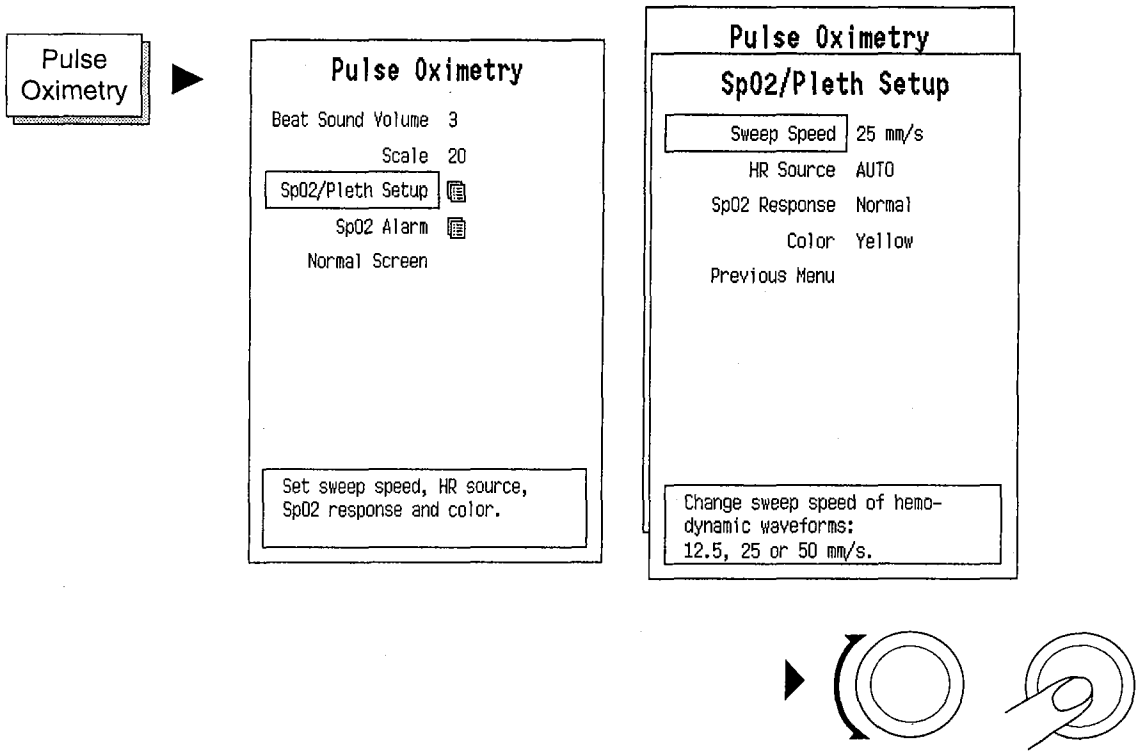
Alarm Limits

SpO_2 adjustable 50 - 100 %, OFF

Auto Limits

SpO_2 HIGH	Not applicable
SpO_2 LOW	SpO_2 - 5 %

SpO_2 and Plethysmographic Setup Adjustments



SWEEP SPEED

Sets the sweep speed of the waveform display. The sweep speeds available are 12.5, 25, or 50 mm/sec on a 14" screen.

NOTE: The sweep speed is always the same for all the hemodynamic waveforms and the plethysmographic pulse wave.

HR SOURCE

Selects the heart rate source. If the ECG signal is affected by too much noise for a reliable heart rate calculation, heart rate can be calculated from PRESSURE (Art) or PLETHYSMOGRAPHIC PULSE waveform. The selected heart rate source is shown above the numerical display of the heart rate. The color of the heart rate is the same as the source parameter.

The AUTO selection priorities for heart rate calculation are: ECG (the lead with highest R-wave), Pressure (Art), and Plethysmographic pulse waveform.

SpO_2 RESPONSE

Inactive when using M-NSAT module. The SpO2 response mode is automatically set as Normal, 5-7 seconds averaging.

COLOR — This feature allows you to change color of the Pleth waveform. Your choices are: YELLOW, WHITE, GREEN, RED, or BLUE.

PREVIOUS MENU — Returns you to the previous menu level.

Nellcor Sensors

Select the correct sensor type.

Use one of the following Nellcor sensors with the M-NSAT module:

OXISENSOR II Oxygen transducer

D-25, D-25L	Adult
D-20	Pediatric
I-20	Infant
N-25	Neonatal/Adult
R-15	Adult Nasal

OXICLIC Oxygen transducer

A	Adult
P	Pediatric

DURASENSOR Oxygen transducer

DS-100A	Adult

DURA-Y Oxygen transducer

D-YS	Adult/Pediatric/Infant/Neonatal

OXIBAND Oxygen transducer

OXI-A/N	Adult/Neonatal
OXI-P/I	Pediatric/Infant

NOTE: Do not use Datex pulse oximetry sensors with the M-NSAT module.

Select correct measuring site

For correct measuring site and sensor attacment read the Nellcor Directions for Use supplied together with the sensors.

Change Measuring Site Frequently

WARNING: PATIENT SAFETY: To prevent pressure or necrosis, change the measuring site frequently.

Change measuring site every 2 to 4 hours for adults, and every hour for infants, or immediately if skin irritation occurs. For patients with poor peripheral circulation, it is suggested to change the site at intervals of 30 minutes to one hour.

Signal and Data Validity

Datex monitors are designed to minimize the interference of electrosurgery. Under some circumstances electrosurgery may cause noise on the high quality display. Therefore, be careful in interpreting the results, especially the plethysmographic pulse waveform, during electrosurgery.

Interfering Substances

NOTE: The Datex AS/3 Anesthesia Monitor is not able to distinguish between HbCO, MetHb, and HbO_2.

The saturation values may be erroneously high in smokers, or in patients who have burns or carbon monoxide (CO) intoxication.

Intravascular dyes may cause erroneous readings. For example, methylene blue, indigo carmine, indocyanine green or any substances that contain dyes, change the usual absorption of light.

Vasoconstrictive drugs, such as phenylephrine hydrochloride and dopamine may affect the accuracy of the measurement.

Pulse Oximetry with Magnetic Resonance Imaging (MRI)

MRI procedures may be interfered with pulse oximeter, and vice versa. However, each installation is different, one system may work perfectly while a supposedly identical system has serious interference problems.

* If possible, install the monitor outside the MRI chamber.
* Keep the sensor and sensor cable away from the scanned area, burns may result.
* Do not coil the sensor cable in the chamber.

Cleaning

See the Nellcor cleaning instructions supplied together with the Nellcor pulse oximetry sensors.

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13 TEMPERATURE

Overview

Monitoring of perioperative body temperature is indicated if hypothermia is to be induced or if unexpected temperature changes occur.

Two temperature measurement sites can be measured by the monitor using the hemodynamic multiparameter modules M-ESTP, M-ETP or M-EST.

Two additional temperatures can be measured by the Pressure Temp Module M-PT.

Temperature can be measured from various sites using YSI-400 probes or equivalents.

Display of Temperature

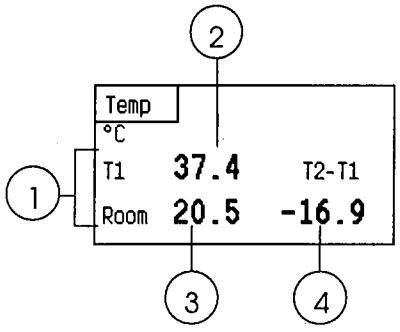


Figure 13-1 T1/T2 Digit Display

(1) Labels
(2) Temperature (TEMP 1) value
(3) Temperature (TEMP 2) value
(4) T2-T1 difference value

The other displays are:

T3/T4

T1,T2, T3 ,T4 and Tblood individually displayed in a digit field.

Module Description

Temperature measurement is included in the hemodynamic multiparameter modules M-ESTP, M-ETP, M-EST, the Pressure Temp Module M-PT and the Cardiac Output module M-COP.

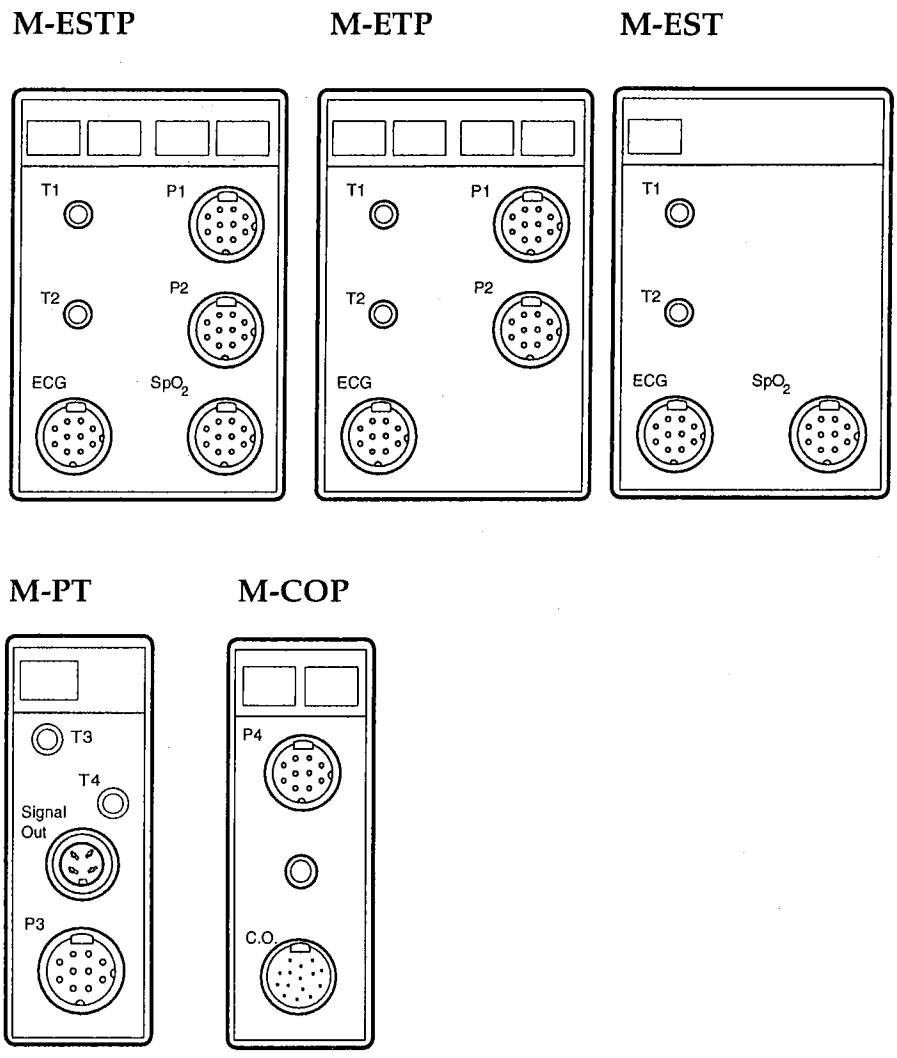


Figure 13-2 Temperature Modules M-ESTP, M-ETP, M-EST, M-PT and M-COP.

NOTE: Do not use identical modules in the same monitoring system simultaneously. The M-ESTP, M-ETP and M-EST are considered as identical modules.

Start Up

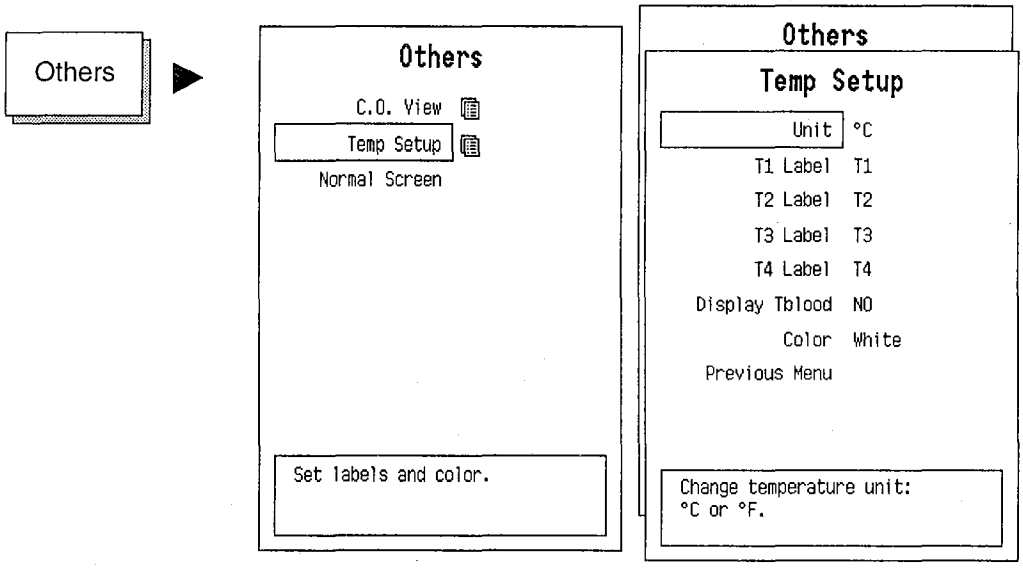
* Check that a module containing temperature is plugged in.
* Attach the probe to the patient.
* Connect the temperature probes to the connectors in the module.

The T1, T2, T3, T4 and temperature differences (T2-T1) (T4-T3) are displayed in the temperature digit field.

Testing Temperature

The temperature measuring function is tested automatically periodically. The message PERFORMING TEMP TEST appears. If the test fails an error message results.

Temperature Setup



UNIT	Selects unit, °C or °F.
T1,2, 3, 4 LABEL	Enables you to label each temperature. Labels are: Label options are: * Eso (Esophageal temperature) * Naso (Nasopharyngeal temperature) * Tymp (Tympanic temperature) * Rect (Rectal temperature) * Blad (Bladder temperature) * Axil (Axillary temperature) * Skin (Skin temperature) * AirW (Airway temperature) * Room (Room temperature) * Myo (Myocardial temperature) * Core (Core temperature) * Surf (Surface temperature)
DISPLAY Tblood	To display Tblood or not. Tblood is measured in Cardiac Output measurement.
COLOR	This feature allows you to change colors for T1, T2, T3 and T4. Choices are: YELLOW, WHITE, RED, BLUE, or GREEN.
PREVIOUS MENU	Returns you to the previous menu level.

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14 INVASIVE BLOOD PRESSURE

Overview of Invasive Blood Pressure Measurement

The transducer converts the pressure variations into electrical signals. The electrical signals are amplified and displayed as numeric pressure values and waveforms.

Display of Invasive Pressures

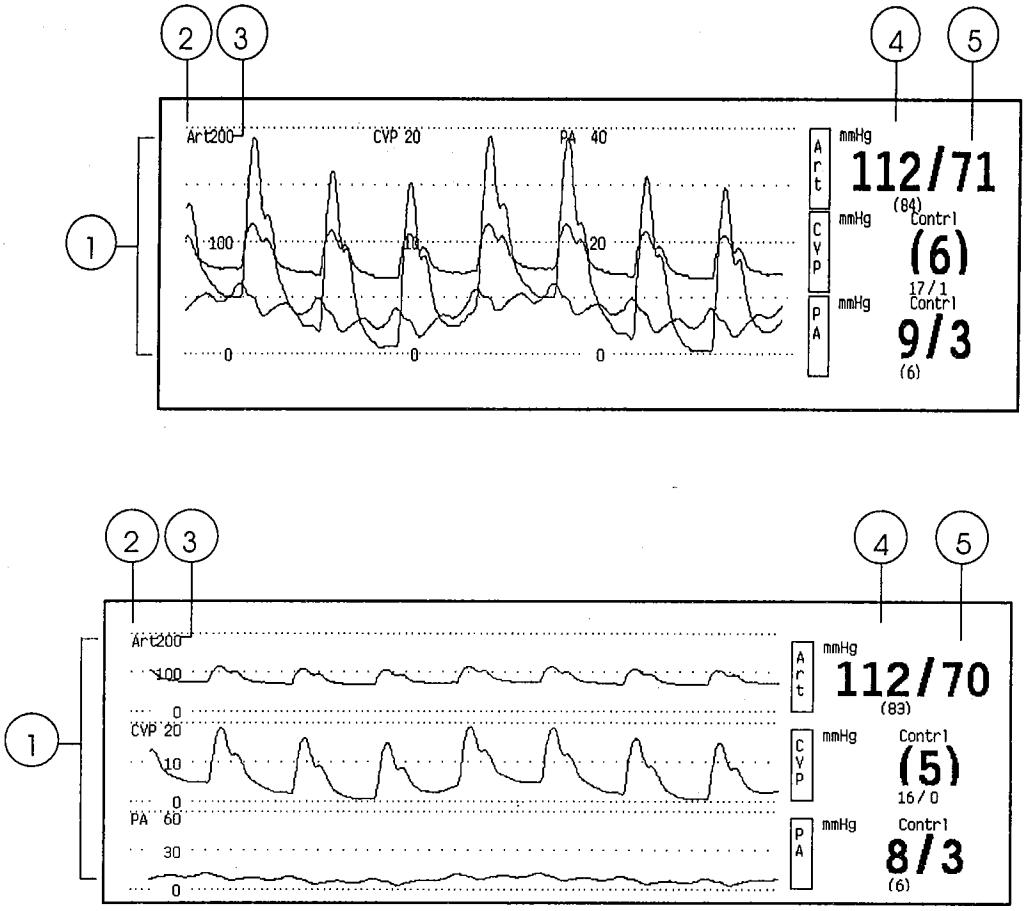


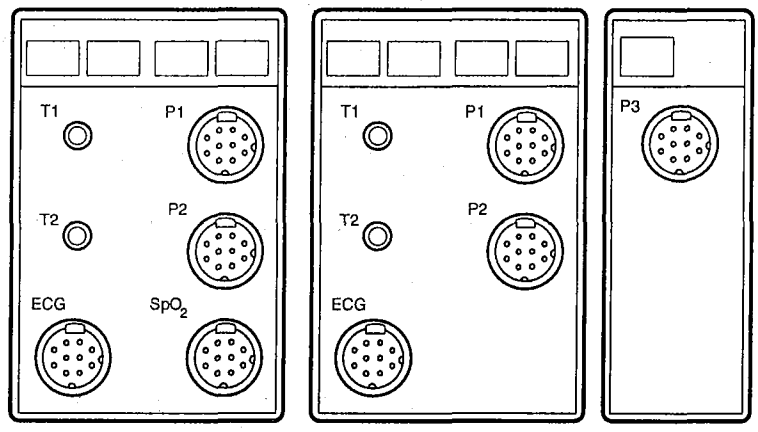
Figure 14-2 Combined and Separated Pressure Waveforms

(1) Invasive blood pressure waveforms with zero and reference lines
(2) Selected pressure label
(3) Selected pressure scale
(4) Message field
(5) Systolic, diastolic and mean pressure values of invasive blood pressures

Selection of separate or combined waveforms is determined in the Monitor Setup/Modify Waveforms menu.

Module Description

M-ESTP M-ETP M-P



M-COP M-PT

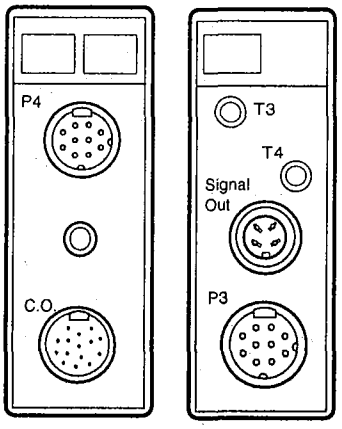


Figure 14-2 Invasive Blood Pressure Modules M-ESTP, M-ETP, M-P, M-COP and M-PT.

NOTE: Do not use identical modules in the same monitoring system simultaneously. The M-ESTP, M-EST and M-ETP are considered as identical modules.

NOTE: Modules M-P and M-PT can not be used in the same monitoring system simultaneously.

Module Keys

There are direct function keys on the modules with pressure measurement to zero each pressure transducer separately.

* Press the key and the message ZEROING appears. After the transducer is zeroed, the message ZEROED appears.

In the modules M-ESTP and M-ETP there is a direct function key for wedge pressure measurement.

* Press the START WEDGE key to start measurement.

Start Up

* Confirm that a module containing invasive pressure is plugged in.

* Connect the pressure transducer to the transducer cable and the cable to the red connector in the module.

* Fill the fluid administration set according to transducer manufacturer's instructions. Ensure that there is no air in the transducer dome or in the catheter line. refer to transducer manufacturers instructions how to remove trapped air from the transducer.

* Connect the patient catheter to the pressure line.

* Mount the transducer kit with the transducer zeroing port at mid-heart level.

* Open the dome stopcock to room air.

* Zero the transducer by pressing the ZERO key on the module or selecting ZERO Px in the Invasive pressure menu.

* Open the dome stopcock to pressure catheter and check the quality of the waveform.

CAUTION: Mechanical shock to invasive blood pressure transducer may cause severe shifts in zero balance and calibration as well as erroneous readings.

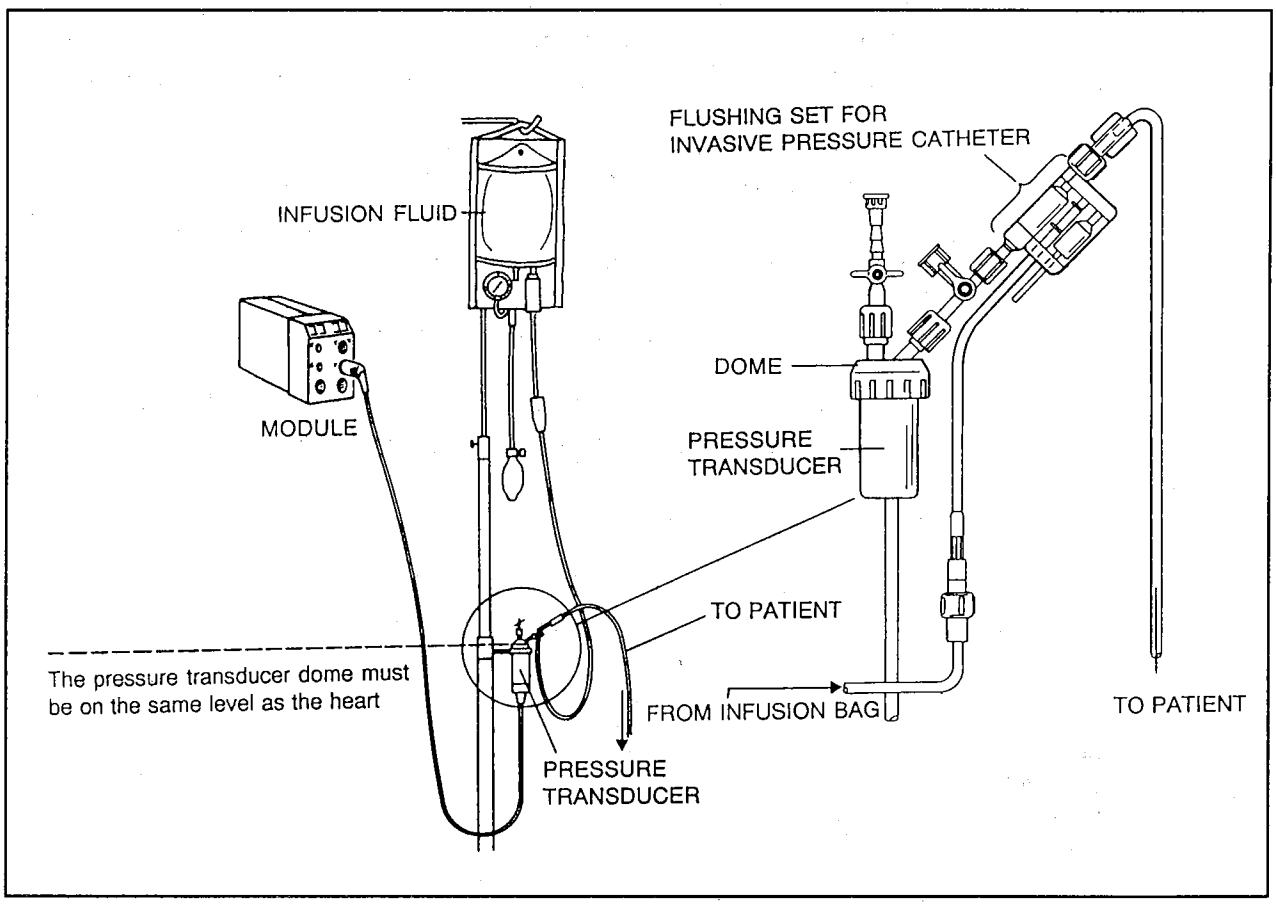


Figure 14-3 Pressure Transducer Setup

Zeroing Transducer

Pressure transducers generally produce a small signal even when no pressure is applied to them. It is necessary to zero the monitor with the transducer to establish an accurate electrical zero point.

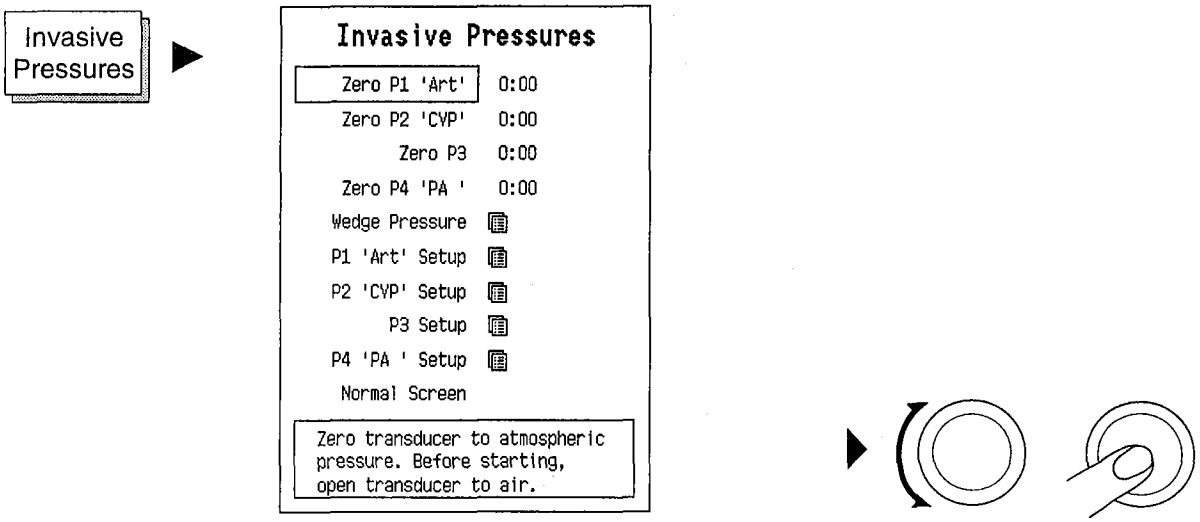
In addition the position of the transducer will effect the accuracy of the measurement. An error of 10 mmHg of static pressure will be introduced for every 13.6 cm (5.4 inches) difference in height between the mid-heart and the transducer.

To zero the transducer, do one of the following:

* Open the transducer to air and press the ZERO P on the module. This starts zeroing immediately,

or

* Press the INVASIVE PRESSURES key on the Command Board and select ZERO P in the Invasive Pressures menu.



During the zeroing process, the message ZEROING is displayed. After the transducer is zeroed, the message ZEROED appears in the digit field.

After each channel is zeroed, the time that zeroing occurred appears in the menu.

Pulmonary Capillary Wedge Pressure

Pulmonary capillary wedge pressure (PCWP) is the occlusion pressure of the pulmonary artery. PCWP can be measured with a pulmonary artery flotation catheter. When the balloon at the tip of the catheter is inflated so that pulmonary artery is occluded, the pressure (PCWP) indirectly reflects the filling pressure of left ventricle.

The monitor uses an algorithm to automatically detect the pressure values at the end of expiration when the artifact caused by respiration is minimal. The mean pressure value is PCWP.

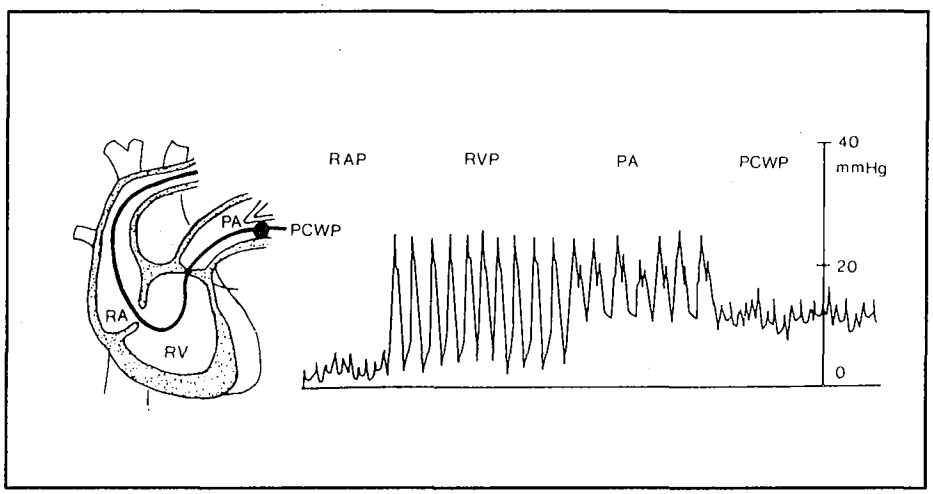


Figure 14-4 Position of Swan-Ganz Catheter in Pulmonary Artery

The pressure waveforms obtained from a balloon-tipped pulmonary catheter during insertion.

Display of Wedge Pressure

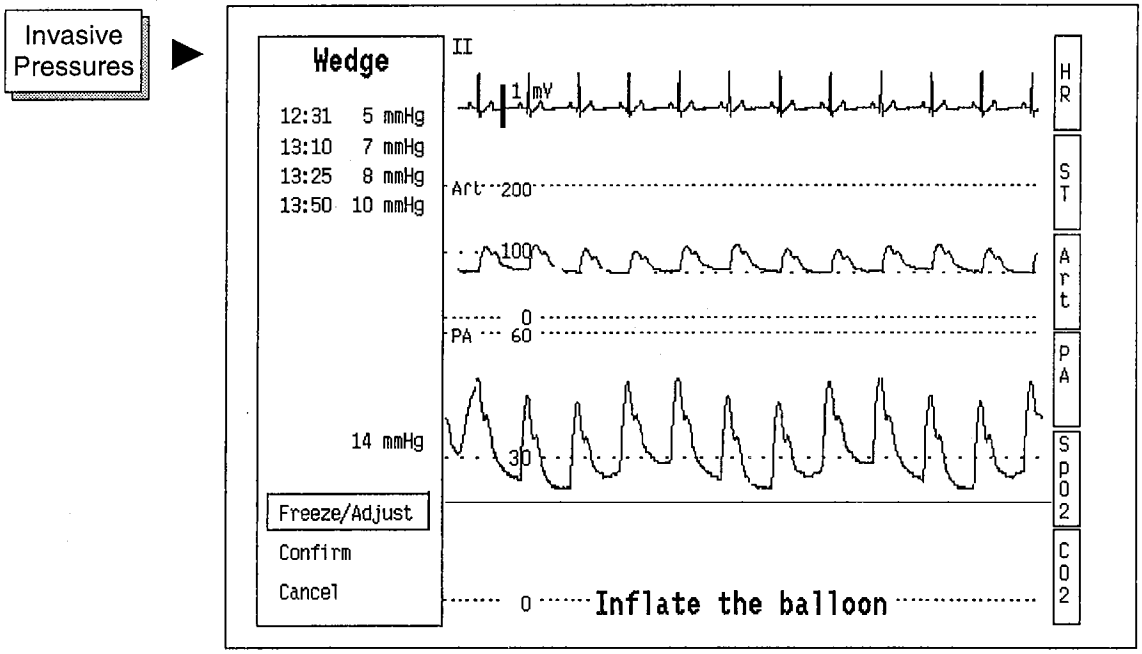
In the Datex AS/3 Anesthesia Monitor there is a special view to examine the PCWP. You can enter this view via the Invasive Pressures menu.

The speed of the waveforms in the Wedge Pressure menu is 12.5 mm/s.

Starting PCWP Measurement

If you have not designated a pressure channel as PA, a selection window appears on the display to label one pressure channel to become PA. Make your choice of channels and press the Com-Wheel. That channel will be labelled PA. If you select NONE it brings you back to the Invasive Pressures menu.

* Push the START WEDGE key, your module or select Wedge pressure from the Invasive Pressures menu.



NOTE: Only active pressure channels are displayed (the module is installed and the transducer is connected).

* Inflate the catheter balloon when the message INFLATE THE BALLOON is displayed in the PA waveform field.

* Monitor searches for the end expiratory pressure and displays the value in the waveform field and menu.

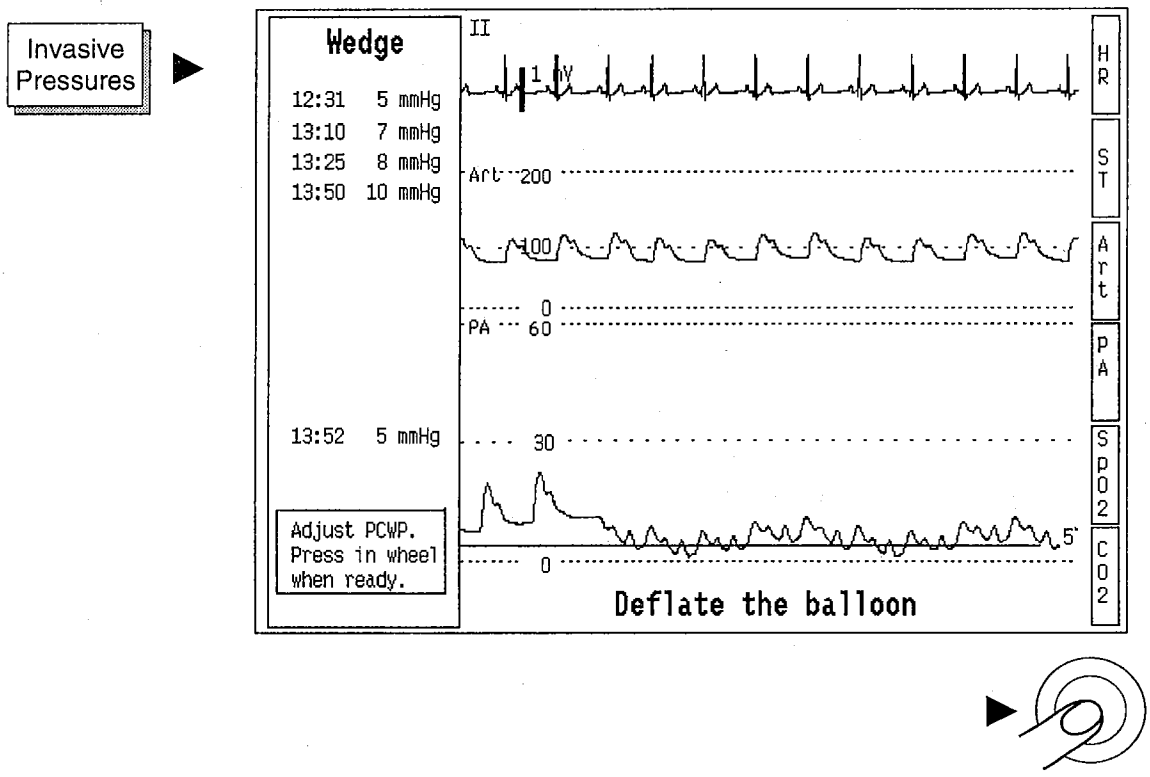
* The waveform will be frozen automatically in 20 seconds. (During these 20 seconds you can also select FREEZE/ ADJUST and press the ComWheel. The PA waveform will be frozen.)

* Deflate the balloon when the message is displayed on the PA waveform field.

Adjusting PCWP

If you want to manually adjust the PCWP pressure level:

* Move the cursor by rotating the ComWheel. A message ADJUST PCWP VALUE will be displayed.



* After adjusting, push the ComWheel and push again to confirm.

Cancelling PCWP Measurement

If the measurement did not succeed:

* Select CANCEL. This cancels the whole measurement.

* The first menu appears so you may start a new measurement.

NOTE: During the wedge pressure measurement PA values are not trended and PA alarms will be disabled.

Labeling Invasive Line

When a label is assigned to a pressure channel, the pressure scales, waveform color, and alarm source and limits are also assigned. The labels are as follows:

P1,P2,P3,P4 Standard labels

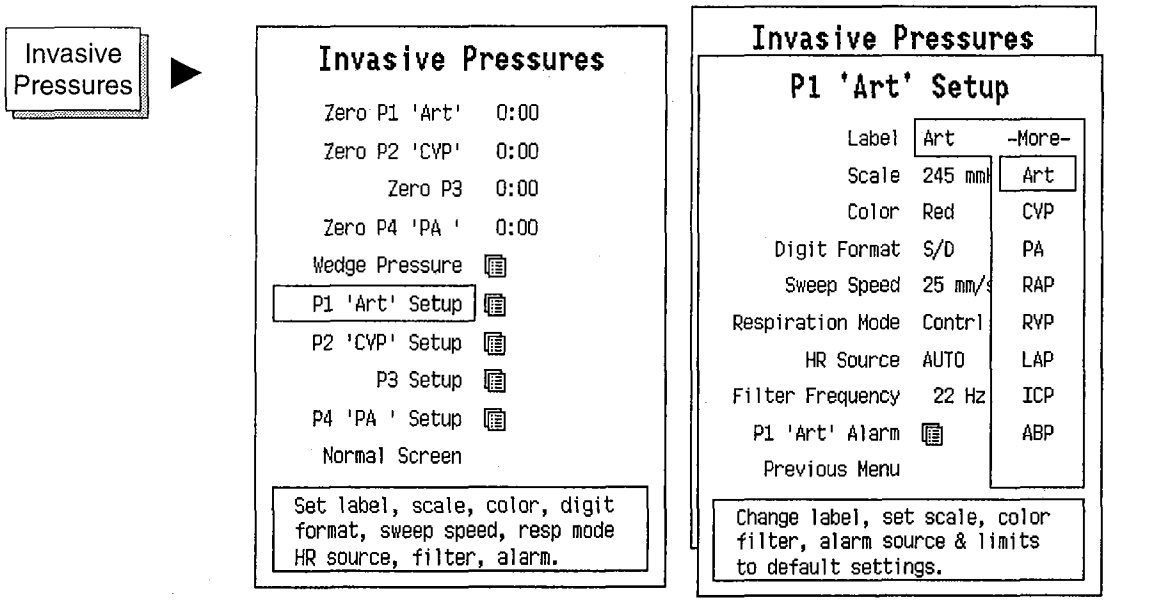
Art	Arterial pressure
CVP	Central venous pressure
PA	Pulmonary arterial pressure
RAP	Right atrial pressure
RVP	Right ventricular pressure
LAP	Left atrial pressure
ICP	Intracranial pressure
ABP	Arterial Blood Pressure

Both Art and ABP labels are available for situations when two arterial lines are desired but you may want to use different settings or alarm labels.

NOTE: If PCWP is to be measured, one channel must be labelled 'PA'.

Table 14-1 Waveform Scales and Colors, and Alarm Sources and Limits that are Assigned When the Label is Selected

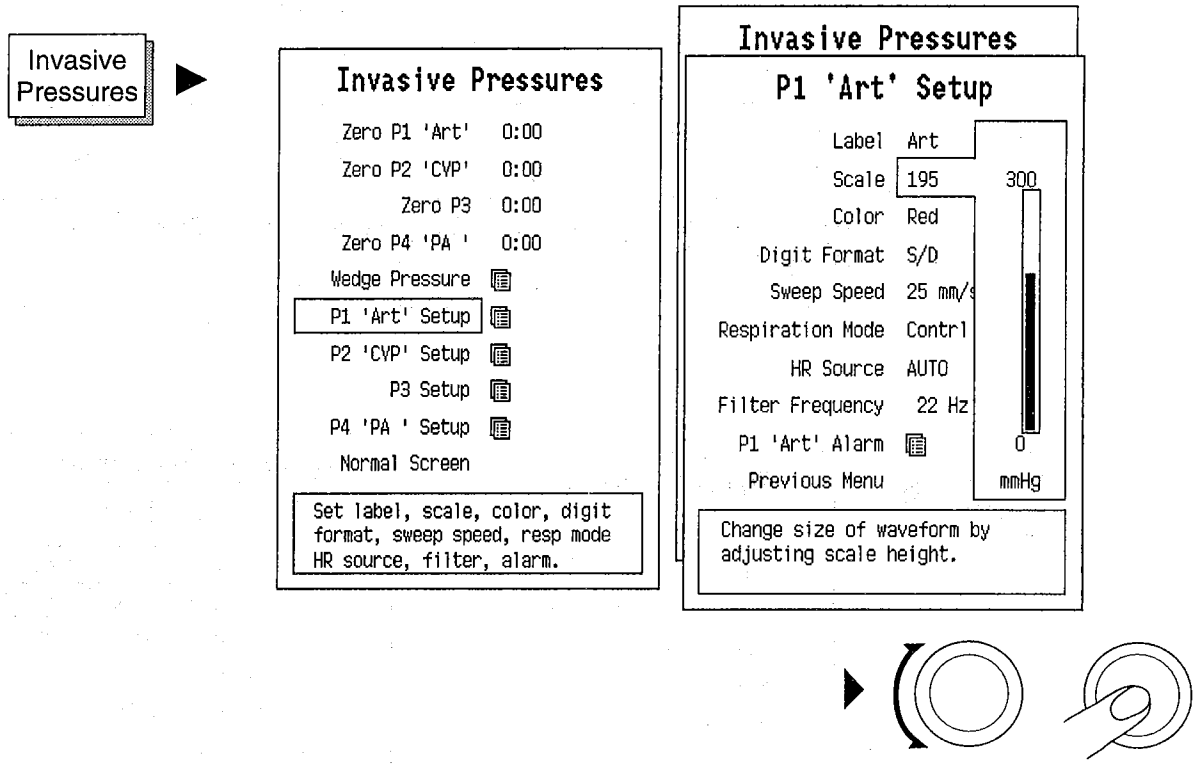
LABEL	P1 Art	P2/P3 CVP	P4 PA	RAP	RVP	LAP	ICP	ABP
Scale	200	20	60	20	60	20	20	200
Colour	Red	Blue	Yellow	White	White	White	White	Red
Alarm source	sys	off	off	off	off	off	off	sys
Alarm limits	180 80	off	off	off	off	off	off	180 80
Large numerics	Sys/Dia	Mean	Sys/Dia	Mean	Mean	Mean	Mean	Sys/Dia



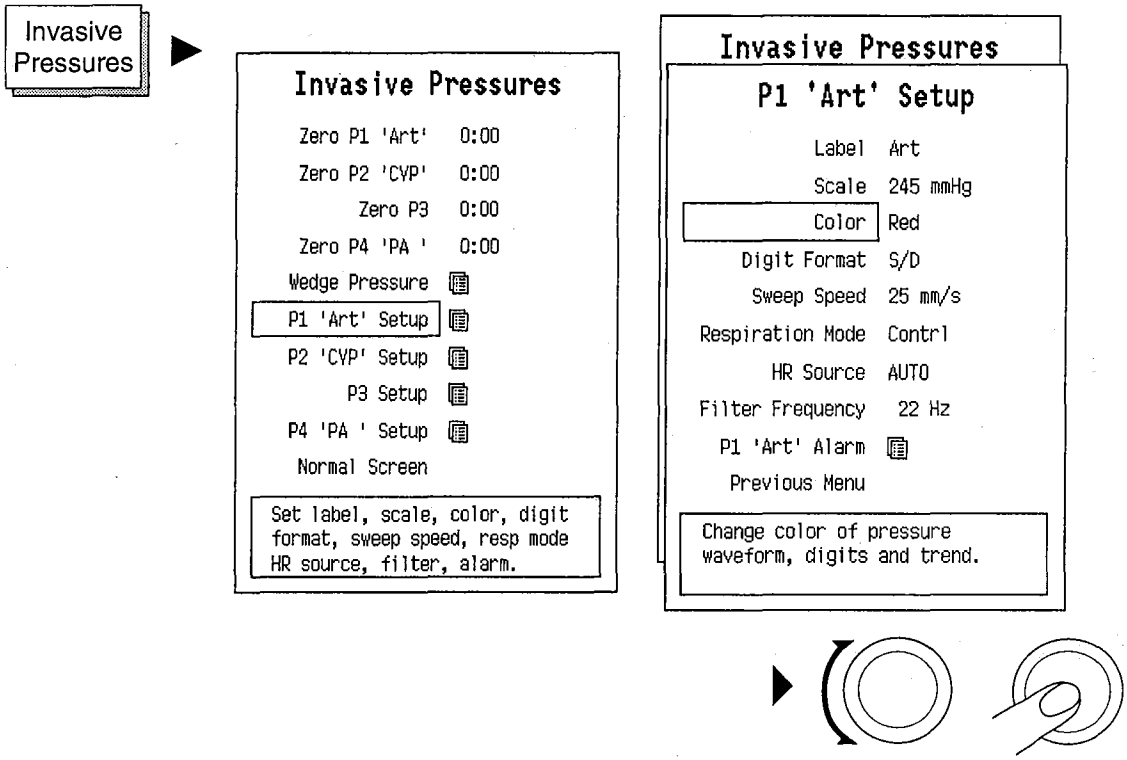
Changing Scale

This selection is used to change the scale for a pressure channel from the scale that was assigned when the channel was labelled.

Scales can be adjusted between 10 and 300 mmHg in steps of 10.



Other Pressure Setup Adjustments



COLOR — This feature allows you to change the waveform color from the color that was assigned when the channel was labelled. Your choices are: RED, YELLOW, WHITE, GREEN, or BLUE.

DIGIT FORMAT — With the numeric display format you can choose to display either the Systolic/Diastolic numbers in large size or then the Mean pressure value in large size.

SWEEP SPEED — Sets the speed of the display sweep for the waveform display. The sweep speeds available are: 12.5, 25, or 50 mm/sec on a 14" screen.

NOTE: The sweep speed is the same for all the hemodynamic parameters and plethysmographic pulse wave.

RESPIRATION MODE — Respiration causes artifacts in invasive pressures. At the end of expiration the artifact is at smallest.

There is a possibility to select the SPONT mode for spontaneous respiration and the CONTRL mode for controlled ventilation.

HEART RATE SOURCE If the ECG signal is affected by too much noise for a reliable heart rate calculation, heart rate can be calculated mechanically from the PRESSURE (Art) or Plethysmographic pulse waveform. The selected heart rate source is visually shown above the numerical display of the heart rate. The color of the heart rate is the same as the source parameter.

AUTO selection prioritizes the heart rate calculation in a specified order: ECG (the lead with highest R-wave), Pressure (Art), and Plethysmographic pulse waveform.

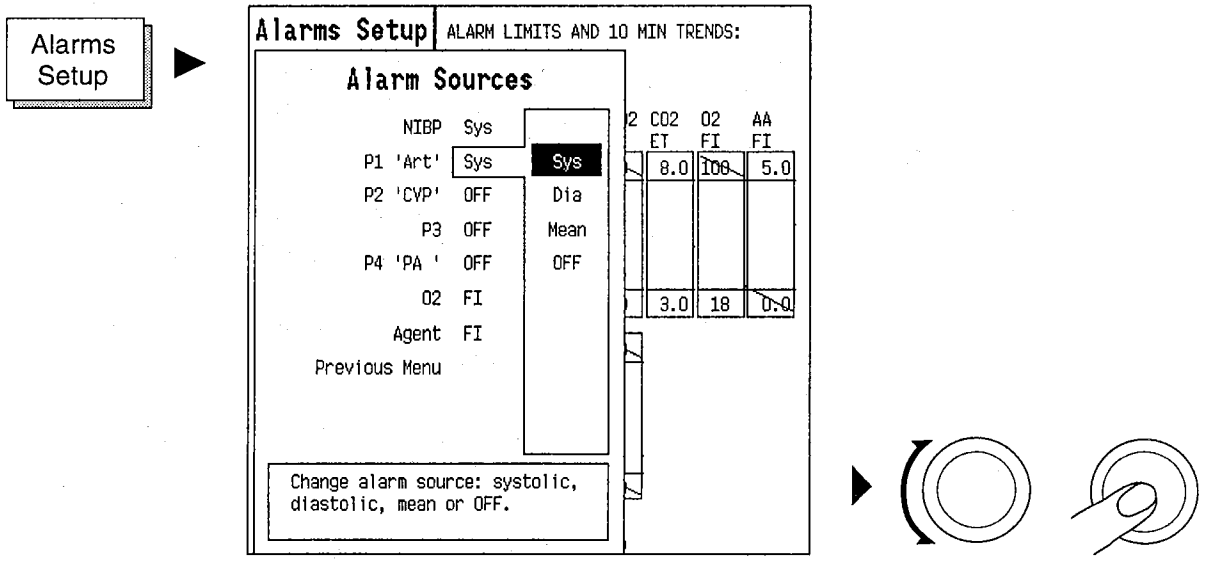
FILTER FREQUENCY Measured signal is filtered to remove noise and artifacts. The filter can be adjusted between 4 and 22 Hz with the ComWheel.

PRESSURE ALARMS Alarms can be adjusted in the Alarms Setup menu or accessed through this menu.

PREVIOUS MENU Returns you to the previous menu level

Selecting Alarm Sources

Alarm sources can be selected or turned off in the alarm sources sub menu under the Alarms Setup menu. The selections are SYSTOLIC, DIASTOLIC, MEAN (or OFF) as the high and low alarm limit source.



Alarm Messages and Limits

Table 14-2 InvBP Messages

INVASIVE BLOOD PRESSURE	
MESSAGE	**EXPLANATION**
P1 low P2 low P3 low P4 low	Invasive pressure of marked channel equal or below alarm limit
P1 high P2 high P3 high P4 high	Invasive pressure equal or above alarm limit
HR low	Heart rate equal or below alarm limit
HR high	Hear rate equal or above alarm limit
No P1 transducer No P2 transducer No P3 transducer No P4 transducer	Transducer or pressure cable not connected

Alarm Limits

Systolic, diastolic, or mean pressure adjustable:
OFF, -40 - 300 mmHg, OFF

NOTE: Default alarm limits are assigned by the selected label, see Labeling Invasive Line.

Auto Limits

Art, ABP, PA, RVP, P1, P4 HIGH Measured pressure x 1.25 + 10
Art, ABP, PA, RVP, P1, P4 LOW Measured pressure x 0.75 - 10

CVP, RAP, LAP, P2, P3, ICP HIGH Measured pressure x 1.25 + 5
CVP, RAP, LAP, P2, P3, ICP LOW Measured pressure x 0.75 - 5

Analog Signal Output

The pressure signal P3 of the Pressure Temp Module can be interfaced to external devices via the Signal Out connector. For more details see the AS/3 Anesthesia Monitor Service Manual.

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15 CARDIAC OUTPUT

Overview of Cardiac Output Measurement

Cardiac output (C.O.) is the volume of blood pumped by the heart per minute. It is measured using a thermodilution principle: The catheter is inserted in the heart with the injectate port in the right atrium and a thermistor in the pulmonary artery. A known amount of liquid colder than blood is injected to the right atrium, mixed with blood and carried to the pulmonary artery. The measured temperature changes are plotted over time, and the cardiac output is calculated of this thermodilution curve.

To compare the patients with different body sizes, cardiac output may be divided by the body surface area (BSA), and is then called cardiac index (C.I.). Body surface area is calculated from the given information, see PATIENT DATA later in this chapter.

Cardiac Output Display

During the cardiac output measurement C.O. View is displayed:

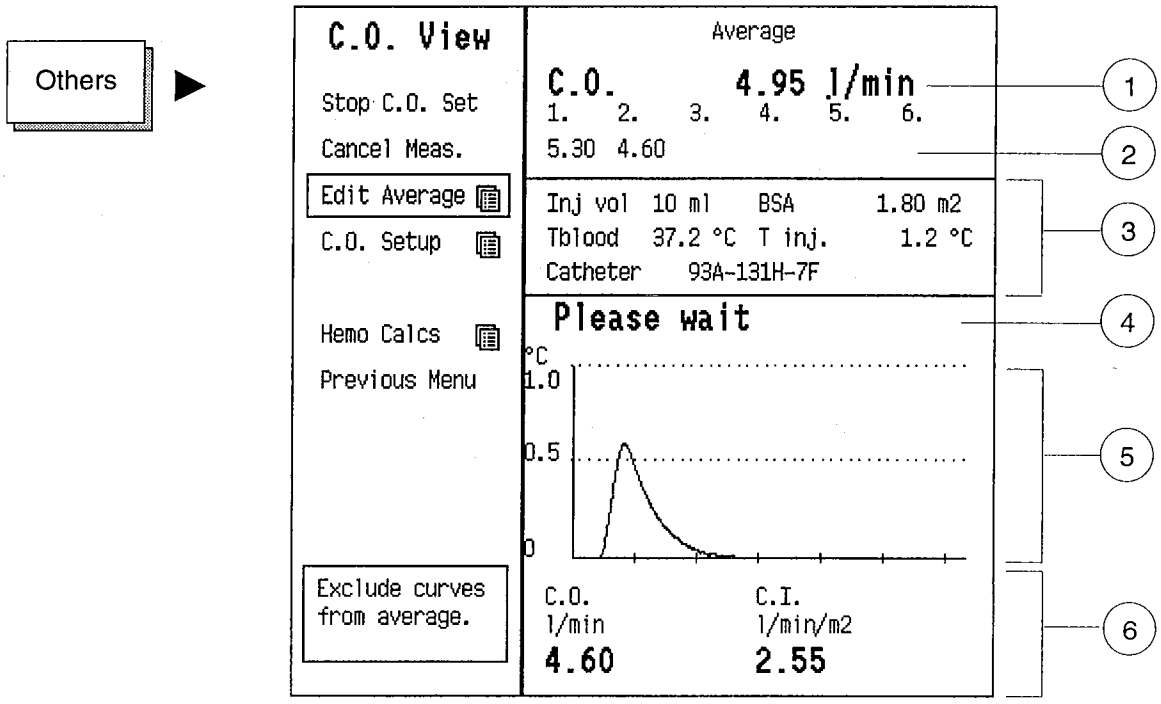


Figure 15-1 Cardiac Output View

(1) Average of measured C.O. values.
(2) Up to 6 measurements.
(3) Injectate volume, body surface area, blood and injectate temperatures, and catheter type.
(4) Message field.
(5) Thermodilution curve.
(6) Last measured cardiac output and index.

In the normal monitoring the numeric value of either cardiac output or cardiac index is displayed with the PCWP value.

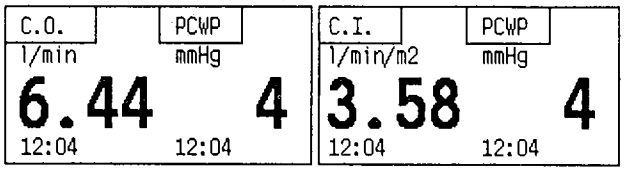


Figure 15-2 Cardiac Output and Cardiac Index Display

Module Description

The cardiac output measurement in the Datex AS/3 Anesthesia Monitor is included in the Cardiac Output Module, M-COP.

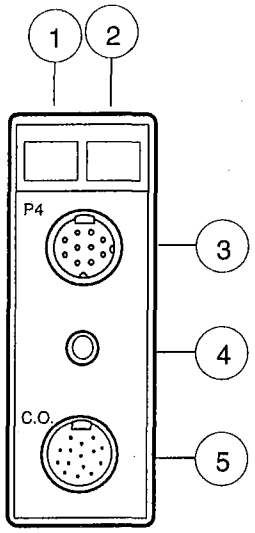


Figure 15-3 Cardiac Output Module, M-COP

(1) Zero P4 key
(2) Module key START C.O.
(3) Connector for invasive pressure transducer (for pressure measurement see Chapter Invasive Pressure)
(4) C.O. self test port
(5) Connector for the thermistor and injectate probe connecting cable

Start Up and Quick Guide

* Confirm that the Cardiac Output Module, M-COP, is properly plugged in.
* Plug the catheter connecting cable in the module, and to the catheter's thermistor connector and injectate probe.
* Connect syringe to the catheter's proximal lumen and injectate probe to the measurement site.
* Press START C.O. key on the module. Alternatively press the OTHERS key and select C.O. View.
* Give your catheter type and injectate volume in the C.O. Setup menu.
* Select START C.O. and inject. Follow displayed notes. Up to six measurements can be made.
* Reject possible improper curves from average calculation in Edit Average menu.
* View all the cardiac parameters in the Display Hemodynamic Calculations view.

See following pages for more detailed description of the procedure.

NOTE: When the cardiac output measuring and viewing is ended by pressing NORMAL SCREEN the individual thermodilution curves and C.O. measurements are erased and only calculated average value is stored.

WARNING: PATIENT SAFETY: All invasive procedures involve patient risks. Use aseptic technique. Follow catheter manufacturer's instructions.

WARNING: PATIENT SAFETY: Do not perform cardiac output measurement during electrosurgery. Erroneous values may result.

Measuring Connections

* Make sure a suitable thermodilution catheter is in place.
* Plug the catheter connecting cable in the module.
* Connect the catheter connector of the cable to the thermistor connector of the catheter.
* Connect the injectate probe connector of the cable to the injectate temperature probe.

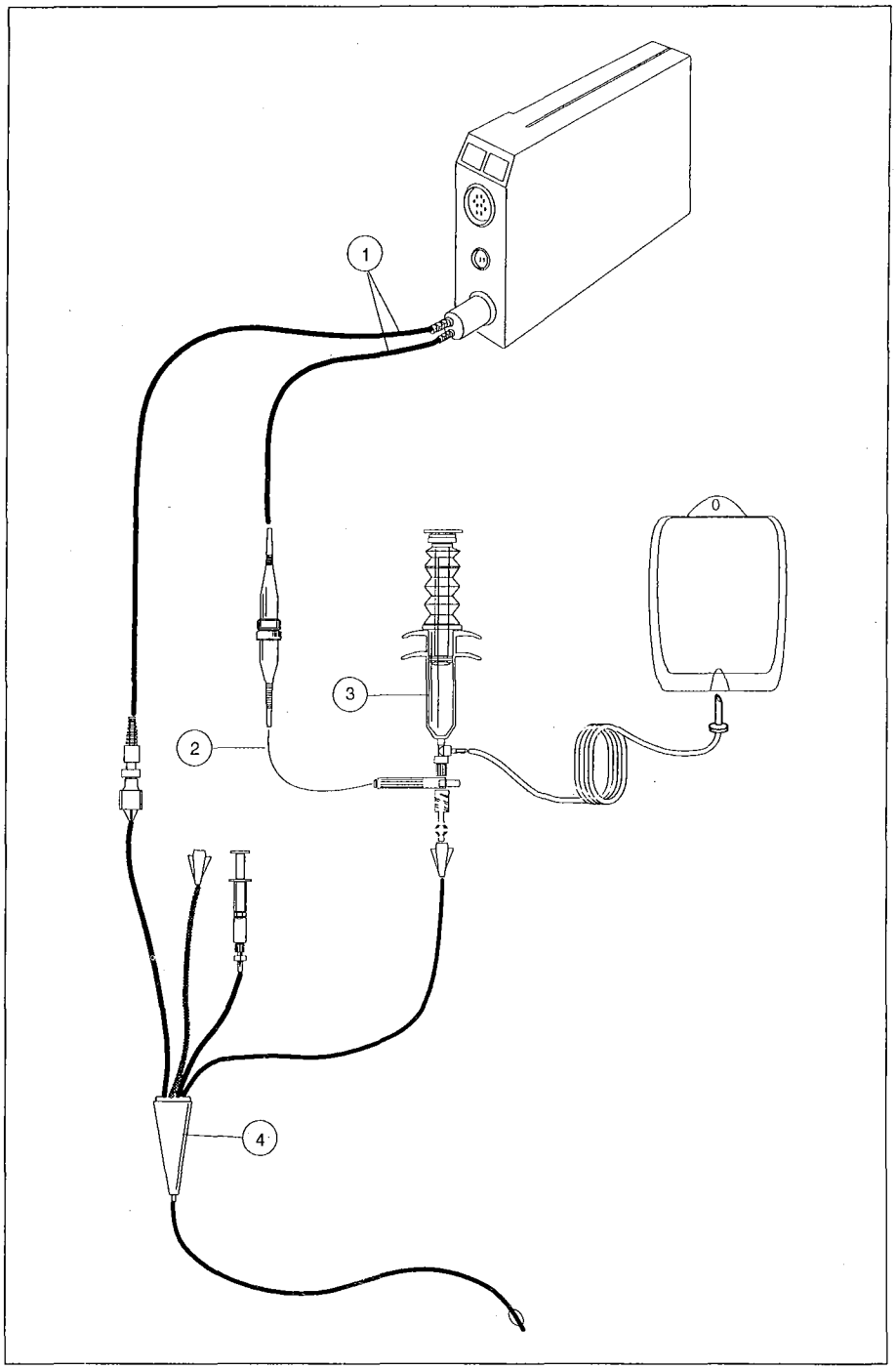
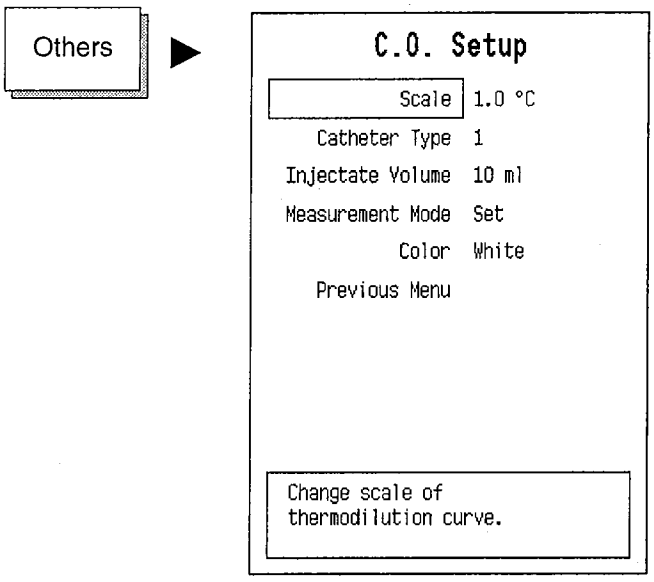
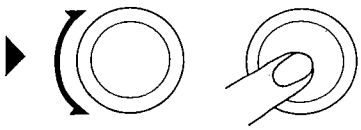


Figure 15-4 Cable Setup with Closed Injectate Delivery System

(1) Catheter connecting cable
(2) Injectate temperature probe
(3) Injection syringe
(4) Thermodilution catheter

C.O. Setups





Change Scale

* Select the scale of the thermodilution curve display of 0.5, 1.0 or 2.0 °C.

Catheter Type and Computation Constant

* Select catheter type in C.O. Setup menu.

There are five catheter types pre-programmed, number 1 being the default value. If one of them is used the monitor calculates the computation constant automatically.

Pre-programmed catheter types:

1 93A-131H-7F, 41223-01, 41229-01, 50324-01, 50325-01
2 93A-141H-7F, 50327-01, 50328-01, 50344-01
3 41216-01, 41217-01, 41232-01, 41233-01, 41300-01
4 93A-831H-7.5F, 93A-931H-7.5F
5 93A-132-5F

If none of the given catheter types is used select USER.

In that case:

* The monitor asks for the computation constant instead of injectate volume.
* See your catheter package for the right constant for your catheter, injectate volume and temperature.
* Enter the constant by rotating the ComWheel and pushing it to confirm.

Injectate Volume

Injectate volume has to be selected when pre-programmed catheters are used.

* Select injectate volume of 3, 5, or 10 ml.

NOTE: Default setting depends on the catheter used. All volume selections may not be possible with all types of catheters.

Measurement Mode

* Select measurement mode in C.O. Setup menu.

Single measurement:

To start a new measurement choose Start C.O. either on the module or in the C.O. View menu.

Set of measurements:

Start a new measurement simply by injecting when the message Inject Now appears.

In both modes up to six measurements can be performed before editing and average calculation.

Displaying Colors

COLOR sets the color of the displayed thermodilution curve and C.O. value. If no other selection is made the color is white.

C.O. Measuring

Injectate Temperature

The recommended injectate temperature range is from 0 to 25°C.

The injectate temperature is measured by the injectate temperature probe and displayed simultaneously on the screen.

The probe can be a bath probe measuring continuously the cooling bath temperature or the infusion bag temperature. Alternatively a flow through probe is used for a closed injectate delivery system. If no probe is connected to the connecting cable a message OFF is displayed, and the monitor presumes that the injectate is iced (T_i is 0°C).

NOTE: With a closed injectate delivery system the displayed T_i is the lowest temperature measured during injection.

Injection

The monitor presumes that 5 % dextrose solution is used. Also physiological saline can be used without significant error.

NOTE: Use only indicator colder than blood temperature. Minimize handling and waiting with a filled syringe before injection. Warm injectate may lead to erroneous C.O. values or impair the measurement.

* Fill the syringe with injectate.
* Start measurement by pressing START C.O. key on the module. C.O. View menu is displayed.
* Inject the injectate smoothly. Injection time must not be longer than 10 seconds.
* Wait until the message PLEASE WAIT disappears before next measurement.

  Wait 1 minute between measurements to allow the catheter temperature stabilize. Nevertheless, the first measurement may be different from the others because of the warmer catheter contents.

* Observe the thermodilution curve which appears on the screen. If its shape or size is unacceptable discharge the measurement by selecting CANCEL MEAS.

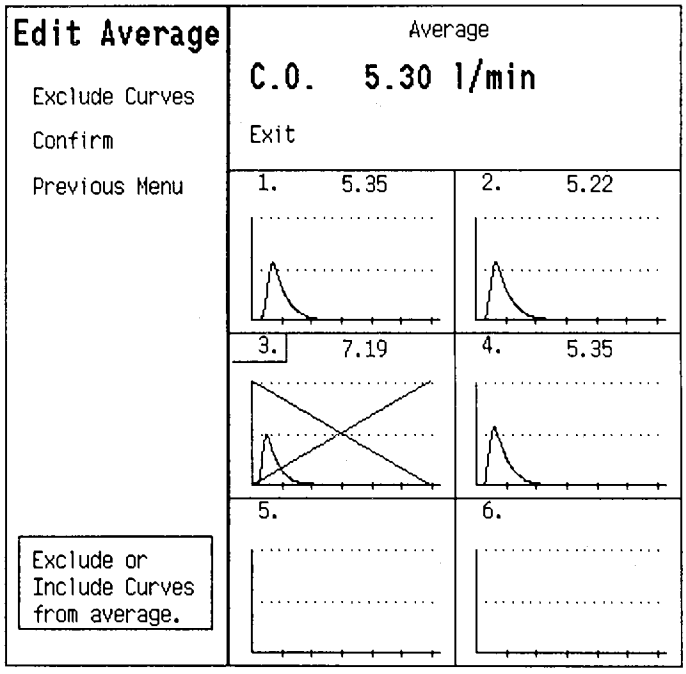
Editing

Many factors may influence cardiac output and its measurement, e.g. injectate volume and temperature, injection time, time between measurements, infusion of other IV solutions, patient's breathing, etc. That is why it is recommended to measure a few curves and take an average of acceptable results.

Up to six measurements can be performed and stored in the memory before editing is needed.

Each measurement can be erased by selecting CANCEL MEAS. before INJECT NOW appears again. Otherwise use Edit Average menu to exclude unsuitable curves from average calculation.

If no curves are selected to be left out, all measured (up to six) curves are used in the average calculation.



* Select Edit Average menu. Measured curves are displayed simultaneously.

* Select the curves to be left out from calculation by moving the highlight and pushing the ComWheel. The selection is marked by crossed lines. Selecting the eliminated curve again takes it back to the group of accepted curves.

* If you want to perform more measurements choose PREVIOUS MENU. More measurements can be performed if less than six curves are accepted. The data of an eliminated curve is erased when a new measurement is started.

* Choose CONFIRM to confirm your selection and to store the average value.

NOTE: Individual curves are erased and only the average value is stored when confirm is pressed . The same happens if Calc. View menu is entered, 15 seconds after pressing NORMAL SCREEN, or if any other menu is entered from the C.O. View menu.

The time of pressing confirm is displayed as the time of C.O. measurement in the normal display and trends.

Hemodynamic Calculations

All the measured cardiac parameters can be displayed and edited, and also parameters measured by other means can be entered to the list of cardiac parameters:

* Select Hemo Calc in the C.O. View.

* Enter or edit input parameters (e.g. measured by other monitors). Edited values are marked by an asterisk.

* Save calculated and entered values by selecting SAVE CALCS. in the Hemo Calc menu.

If calculations are not saved before a new C.O. measurement is made, they will be lost. Up to six sets of calculations can be saved. They can be displayed by selecting TREND OF CALCS in the Hemo Calc menu.

For more information see chapter 8 Patient Data & Calculations.

Cardiac Index

NOTE: To display cardiac index (C.I.) during C.O. View patient height and weight must be given before cardiac output measurement is started.

* Push the PATIENT DATA key on the Command Board.
* Select DEMOGRAPHICS.
* Move the highlight by rotating the ComWheel and push it to adjust the height and weight.
* Body surface area (BSA) is calculated automatically by using du Bois formula.
* After giving the data press NORMAL SCREEN key to return to the normal monitoring.

Oxygen Calculations

Oxygen calculations are derived from Cardiac Output measurements. Oxygen calculations are accessed from the Hemo Calcs menu of the C.O. View or by pushing the Patient Data key. Oxygen calculations are described in chapter 8 Patient Data & Calculations.

Self-Test

The connecting cable functions can be tested simply by attaching the catheter connector of the cable to the C.O. Test port on the module. The test lasts approximately 15 seconds and a message Self-test in progress is displayed.

The message CABLE OK tells that the cable is functioning normally.

If a message CABLE FAULT is displayed replace the cable.

Messages

Table 15-1 Cardiac Output Messages 1

CARDIAC OUTPUT	
MESSAGE	**EXPLANATION**
Curve Under Range	Measured temperature changes are not sufficient for C.O. calculation. Check that right injectate port is used. Use colder injectate, or larger volume.
Curve Over Range	Measured temperature difference is too large. Check that right injectate port is used. Use smaller injectate.
C.O. Out of Range	C.O. value is less than 0.1 l/min or more than 20 l/min.
Tblood Under/ Over Range	The measured blood temperature is out of range. Wait until message disappears before starting the measurement anew.
No Catheter	No catheter connected or connecting cable is faulty. Check connections. Run the C.O. self test to check the cable. If it is O.K., the catheter is faulty.
Noisy Baseline	There is random or continuous change in the patient's blood temperature. This may affect the C.O. value, especially with high flow, or with small volume and room temperature injectates.
Irregular Curve	The measured temperature changes do not form a curve suitable for C.O. calculation. Inject the injectate smoothly, not too fast and not too slow. Also patient's breathing or arrhythmia may interfere with the curve.
Injectate too Warm	The injectate temperature is too close to blood temperature, or it is too warm (more than 27 degrees C). Use colder injectate.

Table 15-2 Cardiac Output Messages 2

CARDIAC OUTPUT	
MESSAGE	**EXPLANATION**
No C.C. Check C.O. Setup	No computation constant can be found for the system injectate volume-catheter-injectate probe. Check the information given in C.O. Setup menu.

Calculation Formulas

Stewart-Hamilton equation:

$$C.O. = (1.08C_T60V_i(T_B-T_i))/(\ DT_B\ dt + C)$$

where

C.O. = cardiac output

1.08 = ${}^{r}_{Dext}\ C_{pDext}\ /\ {}^{r}_{B}\ C_{pB}$ factor comparing density and specific heat of 5 % dextrose solution in water to ones of blood. If saline is used instead of dextrose solution an error of ca. 2 % is caused.

C_T = correction factor for injectate heat loss as it passes through catheter and catheter dead space.

60 = seconds/minute

V_i = injectate volume, liters

CC = computation constant, $1.08C_T60V_i$

T_B = blood temperature, °C

T_i = injectate temperature, °C

t = time, seconds

$DT_B\ dt$ = area under thermodilution curve between times 0 and x, where x is the time when the curve has dropped to 30% of its peak value.

C = Area beneath thermodilution curve between x and end of the curve.

du Bois equation:

BSA = $(\text{height})^{0.725}\ (\text{weigth})^{0.425}\ (0.007184)$

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16 NON-INVASIVE BLOOD PRESSURE (NIBP)

Overview

The non-invasive blood pressure (NIBP) measurement uses the oscillometric measuring principle. The cuff is inflated with a pressure slightly higher than the presumed systolic pressure, then slowly deflated at a speed based on a patient's heart rate, collecting data from the oscillations produced by the pulsating artery. Based on this data, the unit calculates values for systolic, mean and diastolic pressures.

The measurement can be used for adults, children and infants. The monitor automatically recognizes the type of cuff hose (black hose for adults and children, white hose for infants) used for each patient type at the beginning of each measurement.

The NIBP module can be set into an AUTOMATIC CYCLING mode to make measurements at desired time intervals. It is also possible to measure NIBP continuously for five minutes in STAT mode or take separate single measurements.

Display of NIBP

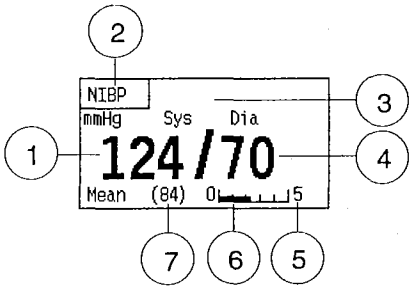


Figure 16-1 NIBP Display

(1) Systolic pressure value of non-invasive blood pressure
(2) Label
(3) NIBP message field
(4) Diastolic pressure value of non-invasive blood pressure
(5) Cycle time indicator
(6) Time since the last autocycle measurement
(7) Mean pressure value of non-invasive blood pressure

Module Description

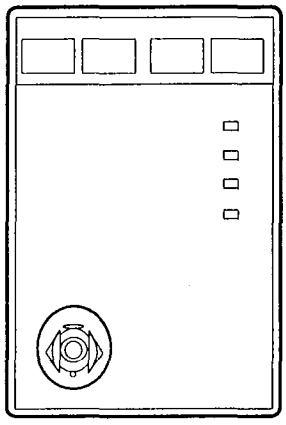


Figure 16-2 Non-Invasive Blood Pressure Module, M-NIBP

NOTE: Do not use identical modules in the same monitor simultaneously.

Module Keys

There are four direct function keys on the module.

Auto On/Off	Starts and stops autocycle measurements.
Set Cycle Time	Selects the cycling time interval.
STAT On/Off	Starts and stops a continuous STAT measurement.
Start Cancel	Starts a single measurement and cancels any measurement.

Start Up

* Check that the NIBP Module, M-NIBP, is plugged in.
* Choose the appropriate cuff and hose.
* Attach the cuff to the patient and the hose to the NIBP connector located on the front panel of the module.
* To begin NIBP measurement, use the module keys by pressing:

  the AUTO ON/OFF key for autocycle, or

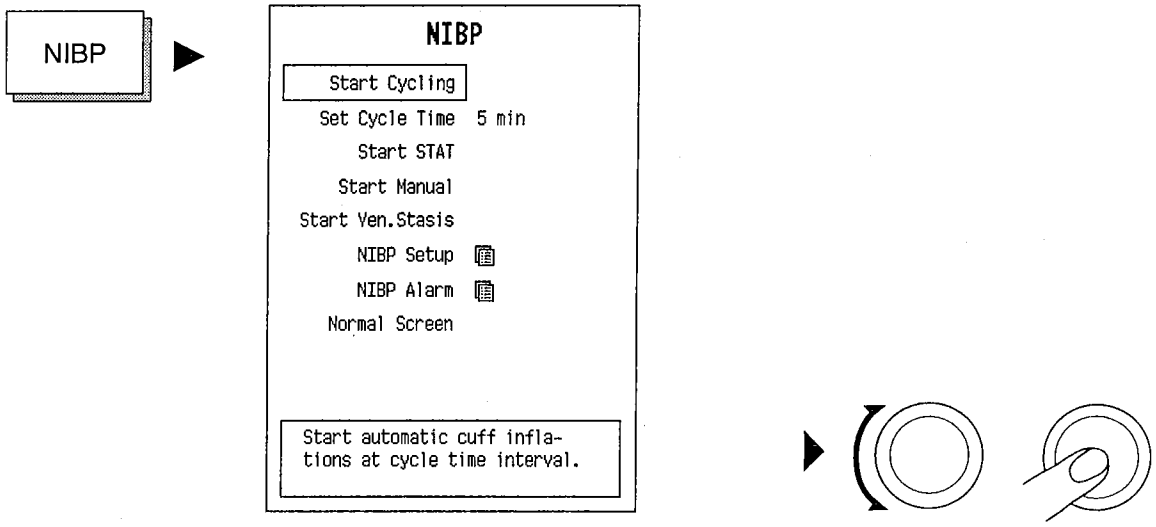
  the START/CANCEL key for single measurement, or

  the STAT ON/OFF key for 5 minute continuous measurement.

During a measurement the monitor will display the cuff pressure in the mean pressure field.

Measuring Non-Invasive Blood Pressure

NIBP measurement can be initiated either using the keys on the NIBP Module, or entering the NIBP menu.



In the beginning of the measurement sys, dia labels are replaced with the inflation limit indication (adult, child, infant) for five seconds. The cuff pressure will be displayed in the mean pressure value field.

If motion artifacts are detected, the monitor automatically holds deflation until the motion stops (maximum of 30 seconds). If the artifacts prevent proper measurement, a new measurement is automatically started.

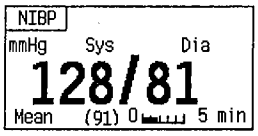
When the measurement is ready, a short beep is heard and result numbers are flashing.

Starting/Stopping Autocycle

The AUTO ON/OFF key initiates or discontinues automatic NIBP measurement at selected intervals (1, 2.5, 3, 5, 10, 15, 30, or 60 minutes). Autocycling is syncronized to real time so that if the first measurement was at 12.02 the next measurement is at 12.05 and again at 12.10 (5 min interval).

To start the autocycling, do one of the following:

* Press the AUTO ON/OFF key on the module, or
* Press the NIBP key and select START CYCLING in the NIBP menu.



The bar from 0 to 5 at the bottom of the NIBP display shows the remaining time to the next measurement.

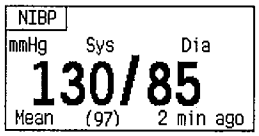
To discontinue the autocycling, do one of the following:

* Press the AUTO ON/OFF key on the module, or
* Press the NIBP key and select STOP CYCLING.

Starting a Manual Measurement/ Cancelling any Measurement

To start the measurement, do one of the following:

* Press the START/CANCEL key on the module, or
* Press the NIBP key and select Start Manual in the NIBP menu.



To cancel the measurement, do one of the following:

* Press the START/CANCEL key on the module, or
* Press the NIBP key and select CANCEL in the NIBP menu.

Starting /Stopping a Continuous Measurement (STAT)

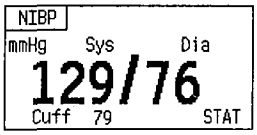
The STAT mode initiates continuous measurement for 5 minutes. A new NIBP measurement is started immediately after the previous one.

In STAT mode the early systolic value is measured and displayed until the final result is available.

After 5 minutes the monitor automatically returns to the previously selected cycling interval or to manual mode.

To start the measurement, do one of the following:

* Press the STAT ON/OFF key on the module, or
* Press the NIBP key and select START STAT in the NIBP menu.



To discontinue the measurement, do one of the following:

* Press the STAT ON/OFF key on the module, or
* Press the START/CANCEL key, or
* Press the NIBP key and select STOP STAT in the NIBP menu.

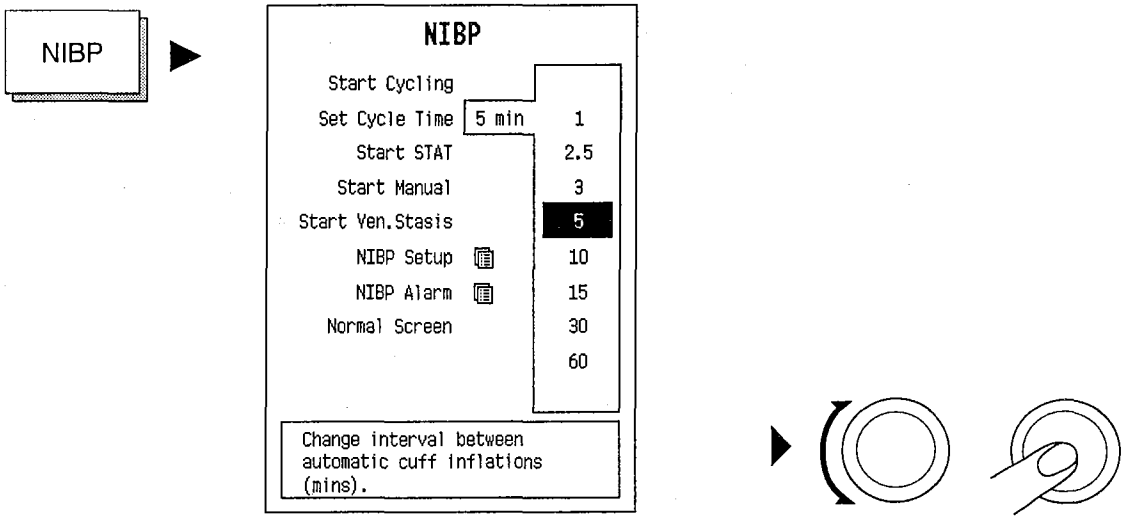
Setting Cycle Time

The following intervals are possible for NIBP measurements: 1, 2.5, 3, 5, 10, 15, 30, or 60 minutes.

To set the cycle time, do one of the following:

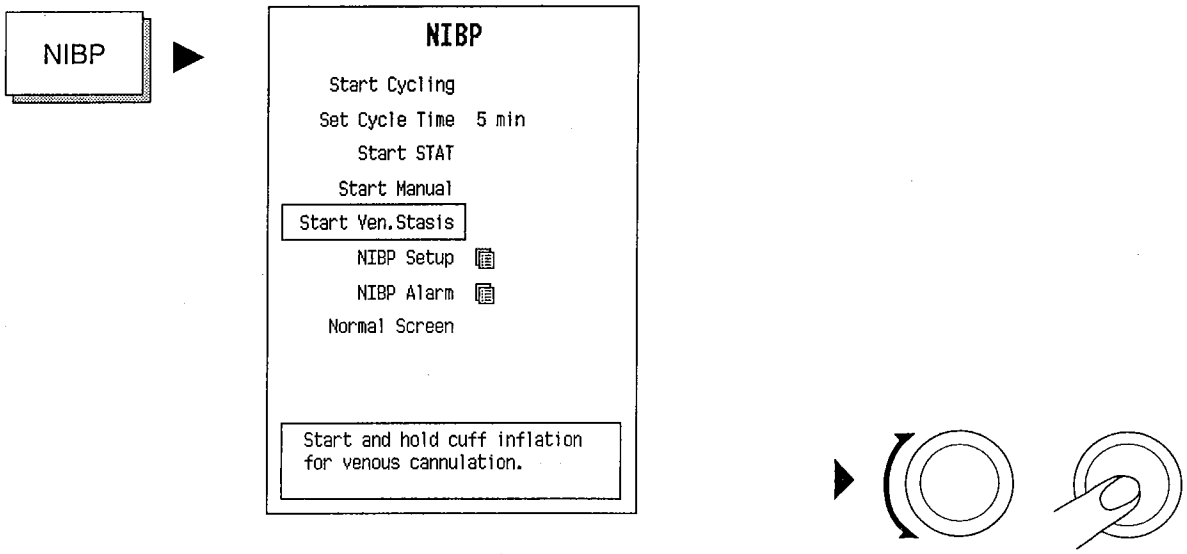
* Press the SET CYCLE TIME key on the module. The NIBP menu appears. Toggle through alternatives. When the cycle time has been selected, the menu disappears in five seconds, or

* Press the NIBP key and select the interval in the NIBP menu.



Using Venous Stasis

Venous Stasis initiates and holds the pressure in the cuff to help venous cannulation. A constant pressure of 40 (infant), 60 (child), or 80 mmHg (adult) is maintained in the cuff for 1 (infant) or 2 minutes (child, adult). The value is selected automatically after the inflation limits (adult, child or infant) are set.



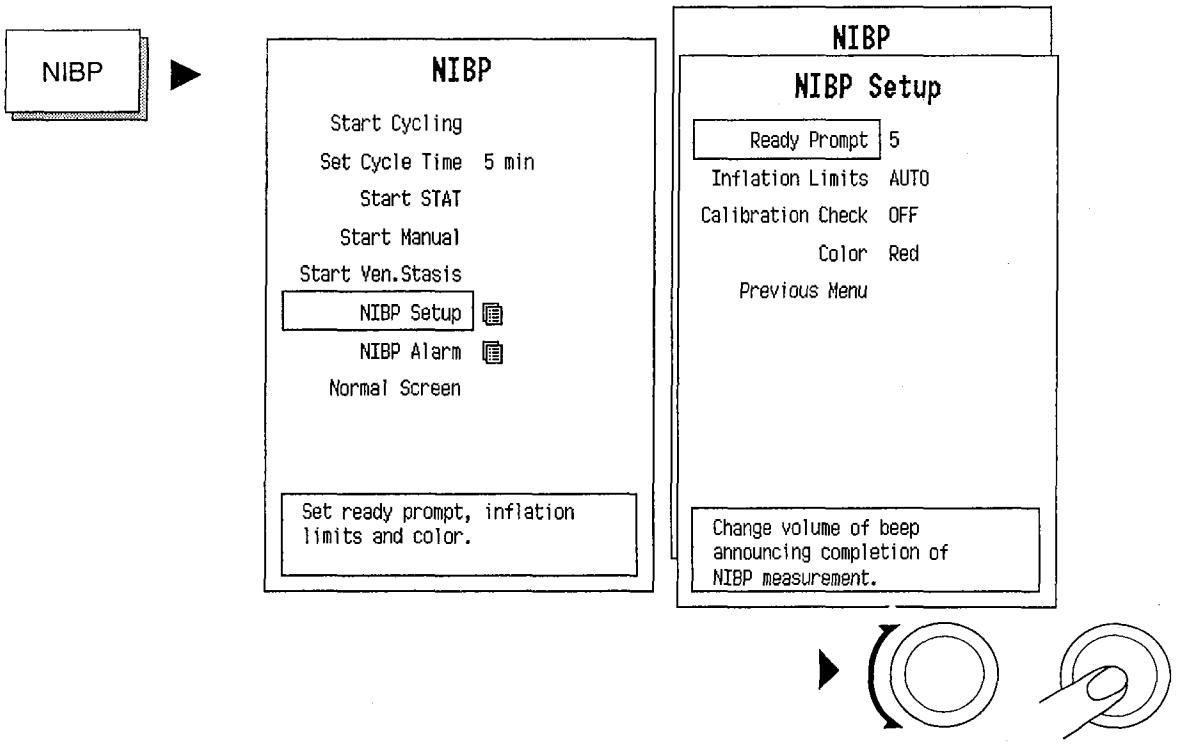
The pressurization time is displayed in the NIBP field and during the last 15 seconds the word STASIS is blinking.

To release the pressure before 2 minutes is expired push the Start/Cancel key on the module or select STOP VEN. STASIS in the NIBP menu and press the ComWheel.

Selecting Alarm Sources

Alarm sources can be selected or turned off in the alarm sources sub menu under the Alarms Setup menu. The selections are SYSTOLIC, DIASTOLIC, MEAN (or OFF) as the high and low alarm limit source.

NIBP Setup Adjustments



READY PROMPT

Ready prompt gives an audible tone to note when the NIBP measurement is finalized. This selection allows you to adjust the volume of the beep tone.

The adjustment ranges from 1 (soft) to 10 (loud) or 0 (OFF).

INFLATION LIMITS

The monitor automatically identifies the cuff hose and selects the right inflation pressure. This selection allows you to override the automatic safety limit feature for the hose/cuff being used.

The selections are: INFANT, CHILD, ADULT, and AUTO.

NOTE: It is not possible to select adult limits with an infant cuff hose.

CALIBRATION CHECK

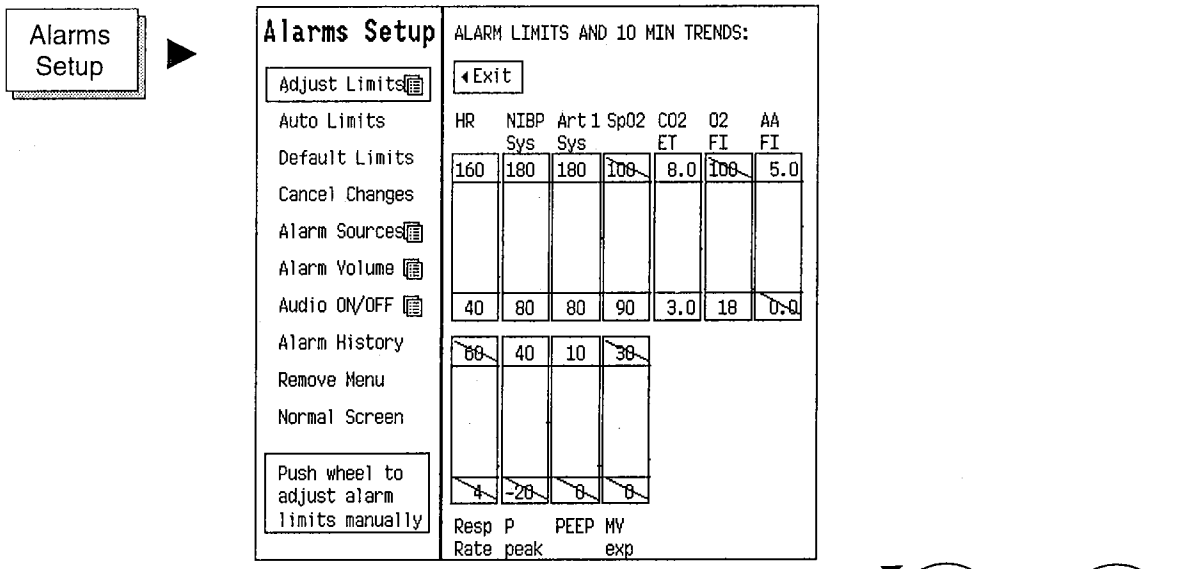
Enables checking the calibration with an external manometer: Remove cuff from the module connector before entering the menu. When the menu appears attach an external manometer with pump to the connector. Pump ca. 200 mmHg and compare the readings of the manometer and display. If the difference is greater than 4 mmHg the calibration by an authorized service person may be necessary.

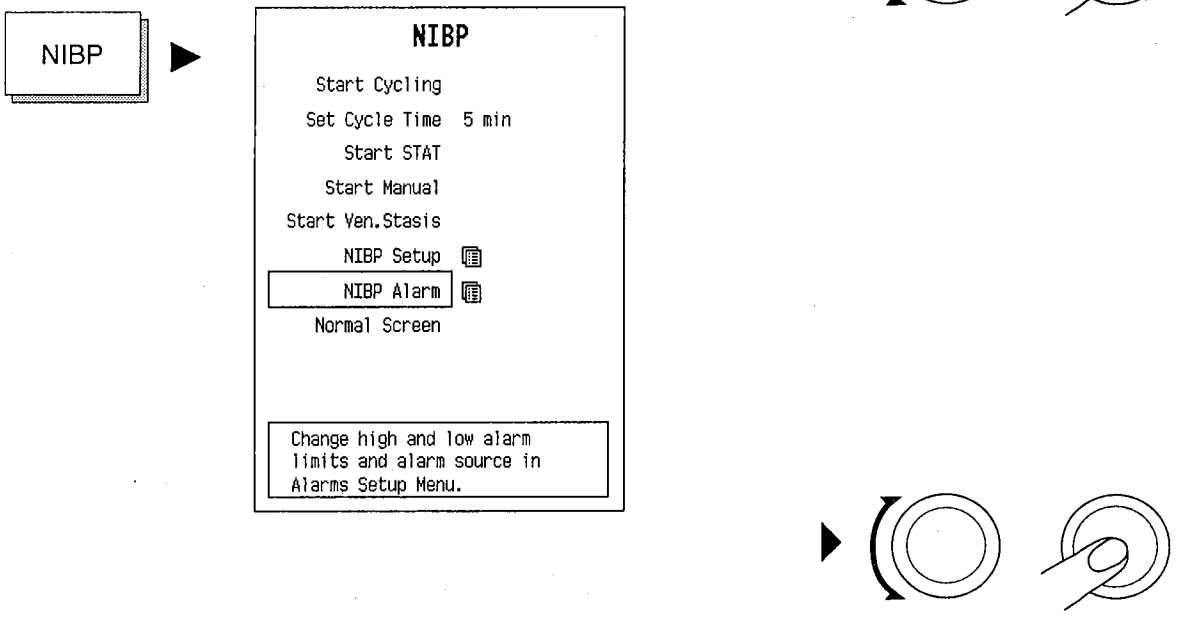
COLOR — This feature allows you to change the color of the NIBP digits. The selections are: YELLOW, WHITE, GREEN, RED, or BLUE.

PREVIOUS MENU — Returns you to the previous menu level.

Setting NIBP Alarms

NIBP alarms can be adjusted in the Alarms Setup menu or accessed through the NIBP menu. See more detailed instructions in the Chapter Alarms, Section Alarms Setup and Adjustments.





Alarm Messages and Limits

Table 16-1 NIBP Messages 1

NIBP	
MESSAGE	**EXPLANATION**
NIBP high	NIBP value is equal or above alarm limit
NIBP low	NIBP value is equal or below alarm limit
NIBP Cuff loose	Cuff is not attached to the patient or it is too loose. The hose is not connected to the module.
NIBP Air leakage	Air leakage in cuff or hose. Check all connections and test the tightness using venous stasis. Repumping during the 2 min period indicates a leakage
NIBP manual	when autocycling mode is interrupted because of air leakage or loose cuff
NIBP Cuff occlusion	Check cuff hose and tubes and restart measurement If problem persists, replace the module and call service to check internal tubings and the calibration
Weak pulsation	weak or unstable oscillation signal due to: - improper cuff position or attachment - weak or abnormal blood circulation - slow heart rate associated with artifacts - Patient is moving or disturbed during measurement - small air leakage
Artifacts	Unsuccessful NIBP because of patient: - movements - shivering - deep breathing - marked arrhythmia or irregular beats Calm down the patient and start a new measurement.

Table 16-2 NIBP Messages 2

NIBP	
MESSAGE	**EXPLANATION**
Cuff overpressure	Cuff is squeezed during measurement and pressure safety limits are exceeded
Unable to measure Sys	Initial inflation pressure is not high enough to enable proper measurement. Systolic pressure probably higher than maximum inflation pressure or artifacts interfere in the systolic area.
Unable to measure Dia	Accurate diastolic pressure difficult to measure because of artifacts, weak pulsation etc.
Unstable zero pressure	Pressure is unstable at start of the measurement. Calm down the patient and retry.
Infl. limits! Check setup	Adult or child cuff is used but the selected infant mode restricts the inflation pressure too low.
Long measurement time	Measurement is prolonged over the max. measurement time, 2 min. in adult or child mode or 1 min. in infant mode. Calm down the patient and start a new measurement. Try also reapplying the cuff.
Wait for the measure ment to be done	When venous stasis is attempted while a regular measurement is underway.
Control measurement	The pressure alarm limit has been violated and a new measurement is automatically started to checkthe blood pressure.
Call service Error XX	NIBP hardware errors. Replace NIBP module and notify service personnel.
Calibration switch ON	The calibration protection switch at the bottom of the module has been turned to the right. Call service to check the NIBP module calibrated.
Calibration not protected	Replace module and call service to check it.

Alarm Limits

Systolic, diastolic and mean pressure adjustable OFF, 15 - 265, OFF

Auto Limits

NIBP sys/dia/mean HIGH	NIBP sys/dia/mean x 1.25 + 10
NIBP sys/dia/mean LOW	NIBP sys/dia/mean x 0.75 - 10

Automatic NIBP Double Check

If the NIBP value exceeds the alarm limits a new measurement is taken automatically (immediately, when MANUAL measurement is selected, and after 30 seconds, when AUTO measurement is selected). If an alarm situation persists an alarm is given.

Patient Connections

Two different cuff hoses with different cuff connections are available:

* BLACK hose for adults and children
* WHITE hose for infants

The monitor automatically recognizes the hose and selects the appropriate inflation pressure. Another inflation limit can be selected in the NIBP Setup menu. As a safety feature adult inflation limits cannot be selected for an infant cuff. For children, select CHILD inflation limits in the NIBP Setup menu.

NOTE: The NIBP system incorporates a safety circuit to prevent overpressurization or prolonged inflation of the cuff.

Table 16-3 Cuff Sizes

CUFF	WIDTH (cm)	FITS LIMB circumf. (cm)
Large adult	15	33 - 47
Standard adult	12	25 - 35
Small adult	9	18 - 26
Child	6	10 - 19
Infant	5	8 - 14
Infant	3	6 - 10

To determine whether the cuff size is correct check that the white index line on the outer edge of the cuff falls between the range lines. If not, use a larger or smaller cuff.

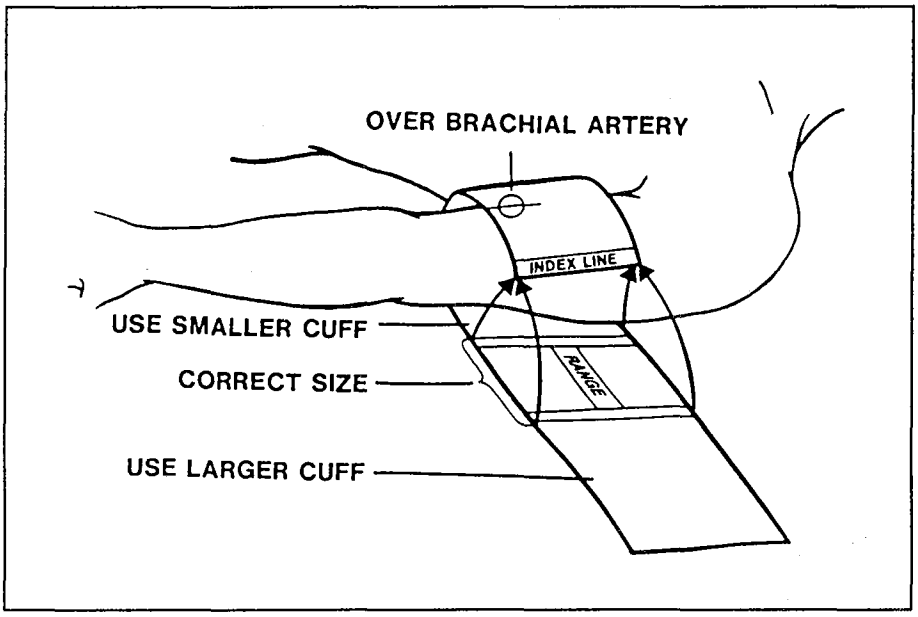


Figure 16-3 Cuff Positioning

Place the symbol indicating the center of the bladder over the artery.

NOTE: When using infant cuffs width less than 6 cm the infant cuff hose must be used. The monitor will automatically recognize the hose and change the safety limits to INFANT.

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17 AIRWAY GASES

Overview of Airway Gases

The Datex AS/3 Anesthesia Monitor offers you the option of measuring and monitoring the gases being delivered to the patient and exhaled by the patient through the anesthesia circuit. This is accomplished using a separate module connected to the Central Unit.

The Airway Module consists of the Datex infrared measuring sensor for measuring CO_2, N_2O, and anesthetic agent, the Datex paramagnetic O_2 sensor, and a gas sampling system.

Respiratory rate is the frequency of peak (end tidal) CO_2 measurements per minute. A breath is defined as a change in CO_2 signal which exceeds 1% (8 mmHg). All concentrations are measured and displayed breath by breath.

Display of Gases

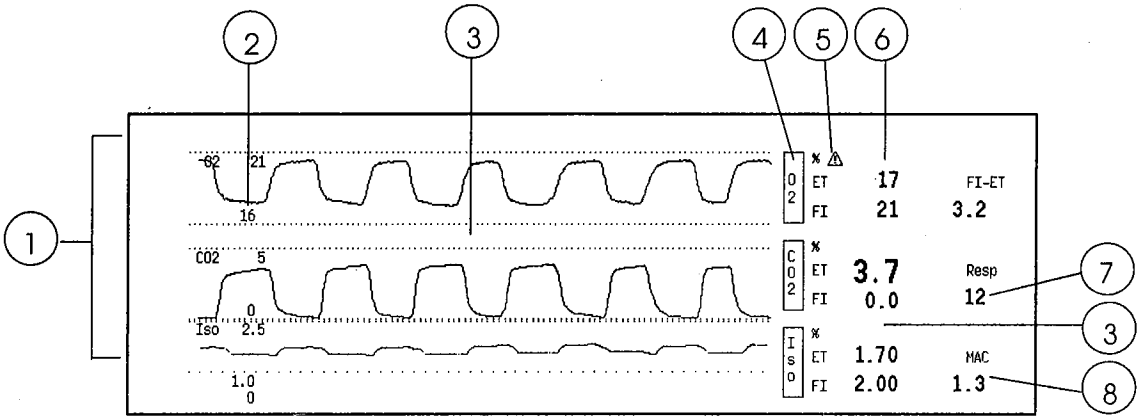


Figure 17-1 Airway Gas Display

(1) Gas waveforms
(2) Scale
(3) Message field for gases
(4) Gas label
(5) Symbol to indicate that FiO_2 low alarm limit is set below 21%
(6) Digit field for ET and FI gas values, and Fi-Et difference
(7) Respiration rate
(8) MAC value, based on measured AA and N_2O ET values

Gases	⚠ O2%	N2O%	Isc%
ET	16	77	1.5
FI	21	77	2.0

Figure 17-2 Lower Digit Field for Gases

Module Description

Airway gas measurement is housed in modules G-O, G-AO, G-AiO, G-OV, G-AOV, and G-AiOV. The modules with letter "i" have also agent identification, and with letter "V" the Side Stream Spirometry measurement.

Table 17-1 Airway Modules

Parameter	G-AO	G-AiO	G-AOV	G-AiOV	G-O	G-OV
CO2	*	*	*	*		*
N2O	*	*	*	*		
O2	*	*	*	*		*
Anaesthetic agents	*	*	*	*		
Agent identification		*		*		
Side Stream Spirometry			*	*		*

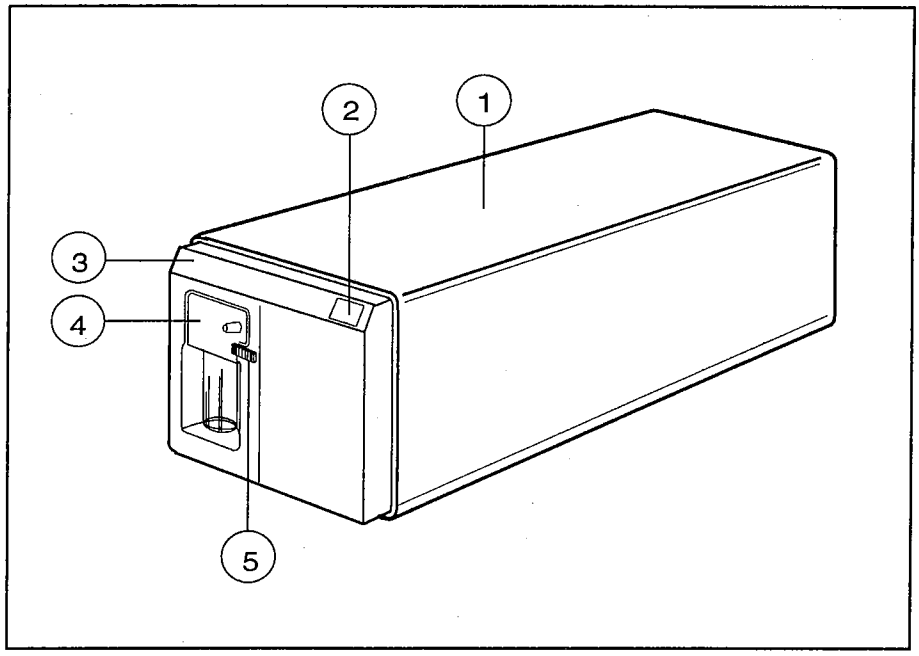


Figure 17-3 Airway Module, G-AO

(1) Airway Module chassis
(2) SELECT AGENT key
(3) Airway Module front panel
(4) D-fend water trap with washable container
(5) Water trap latch

NOTE: Do not use two gas modules in the same monitoring system simultaneously.

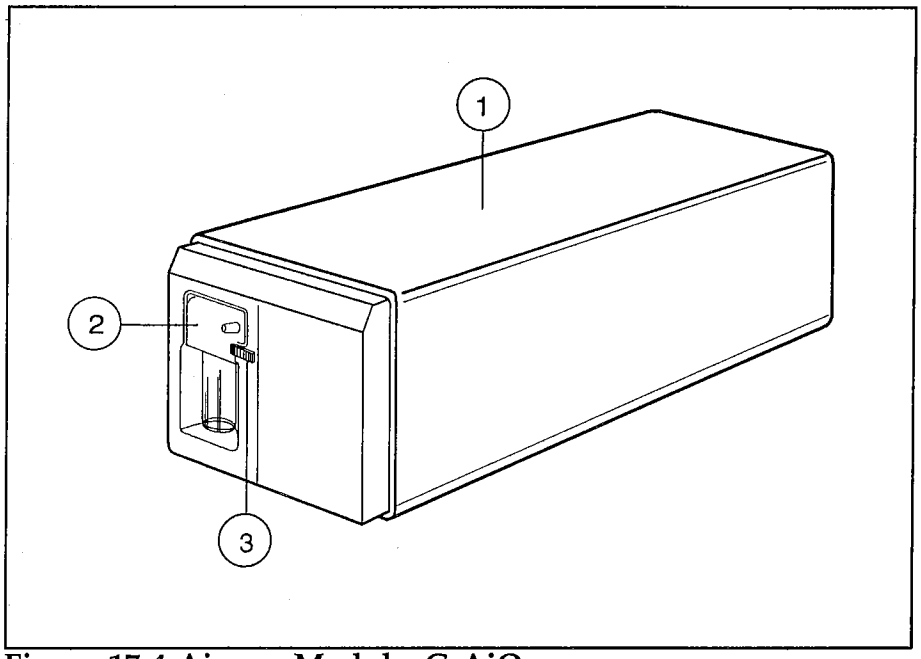


Figure 17-4 Airway Module, G-AiO

(1) Airway Module chassis
(2) D-fend water trap with washable container
(3) Water trap latch

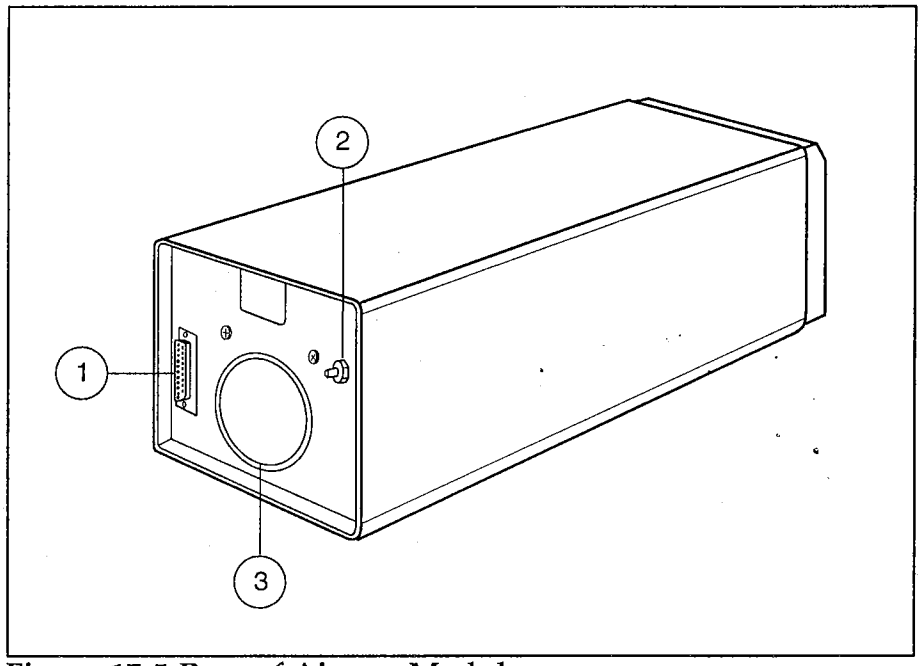


Figure 17-5 Rear of Airway Module

(1) Airway Module connector
(2) Gas sample outlet
(3) Air filter

CAUTION; Turn off the monitor and disconnect the power cord from the mains before connecting or disconnecting the airway module. See the installation manual for details.

Module Keys

If you do not have an Airway Module with agent identification there is one key on the module.

* Press the SELECT AGENT key and toggle through alternatives (Hal, Enf, Iso, Des, Sev).

Start Up

* Check that the Airway Module is installed and the rear cable is connected to the Airway Module and Central Unit. See Installation Manual for instructions of installing and scavenging.

* Confirm that the water trap container is empty and properly attached to the water trap.

* Attach a gas sampling line to the sample-in port on the water trap.

* Turn the power on. A self check is performed.

* Press the SELECT AGENT key on the module to select the desired anesthetic agent. The Airway Gas menu appears. Toggle through alternatives. When the anesthetic agent is selected, the menu disappears in five seconds. The selected agent will be displayed in the gas digit field. If you have the Airway Module with agent identification the agent is selected automatically of Hal, Enf, Iso, Sev and Des.

* Connect the sampling line to the patient's airway adapter.

NOTE: The anesthetic agent can be selected after the message CALIBRATING GAS SENSOR disappears.

Selecting Agent

If you have the Airway Module, G-AO, the agent has to be selected manually. You may select: None (No agent), Halothane, Enflurane, Isoflurane, Desflurane, or Sevoflurane. If you have the Airway Module, G-AiO, with agent identification, the agent can also be selected manually, if desired. See Section Agent Identification.

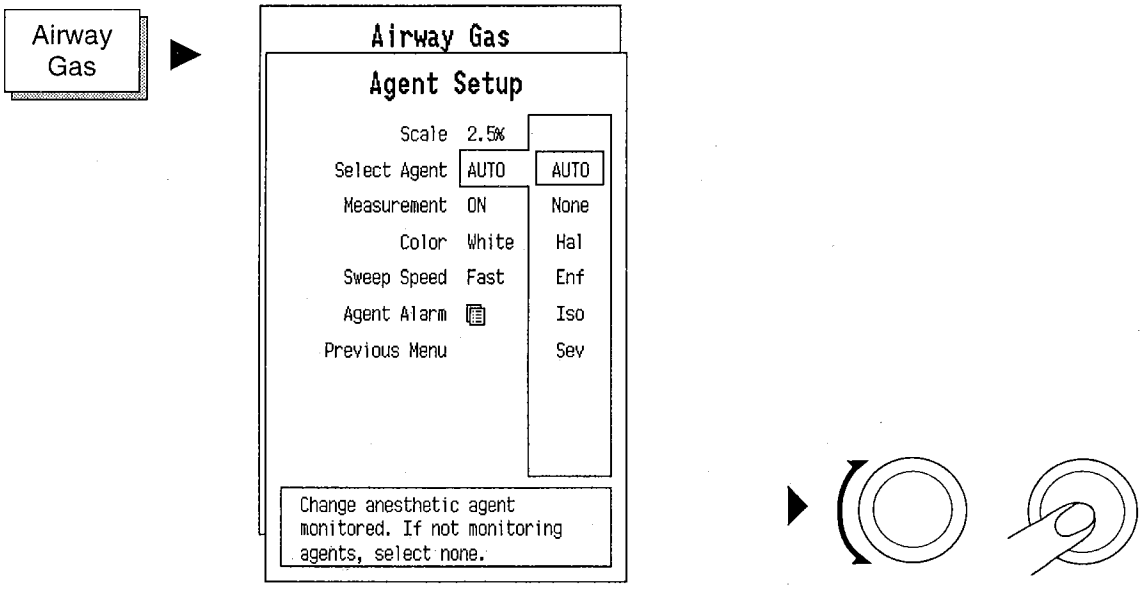
The agent can be selected after the message CALIBRATING GAS SENSOR disappears.

To select the agent, do one of the following:

* Press the SELECT AGENT key on the module. The Airway Gas menu appears. Toggle through alternatives. When the anesthetic agent is selected, the menu disappears in five seconds, or

* Press the AIRWAY GAS key and select Select Agent in the Airway Gas menu.

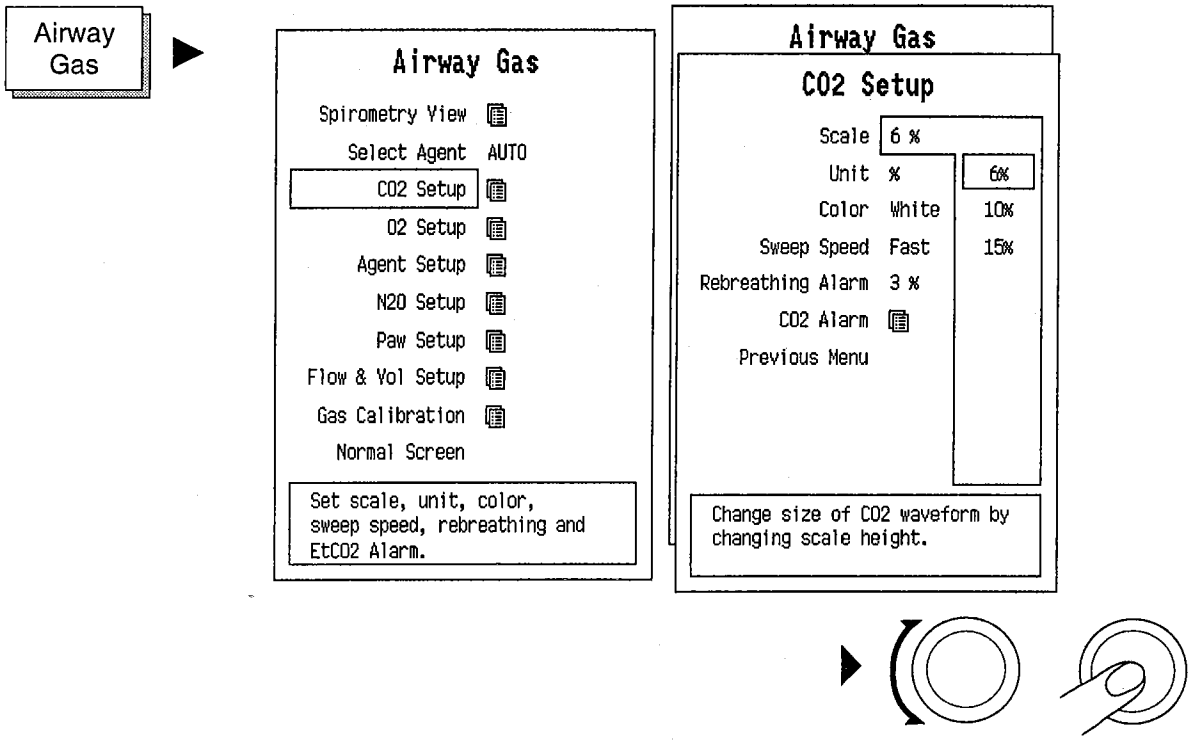
  When the agent is selected an extra gas zeroing may occur.



WARNING: PATIENT SAFETY: Airway Module, G-AO, cannot distinguish between anesthetic agents. Manufacturer assumes no liability for an incorrect anesthetic selection.

WARNING: DATA VALIDITY: Alcohol in patient's breath may increase anesthetic agent readings.

CO_2 Setup



SCALE — Selects 0 - 6 %, 0 - 10 %, 0 - 15 %, or kPa and 0 - 50 mmHg, 0 - 80 mmHg, 0 - 100 mmHg. Scale 0 - 6% is used in normal situations, 0 - 10% and 0 - 15% scales are used if hypercarbia is expected.

UNIT — Selects CO_2 unit: %, kPa, or mmHg. Unit can also be changed in Install/Service menu, see Chapter Monitor Setup.

COLOR — This feature allows you to change color for the waveform and digit field. The selections are: WHITE, YELLOW, GREEN, RED, or BLUE.

SWEEP SPEED — Selects FAST (6.25 mm/sec) or SLOW speed (0.62 mm/sec). Slow waveforms have a sweep speed one tenth of normal, for a full screen sweep (5 minutes). Slow waveforms show changes better than fast waveforms.

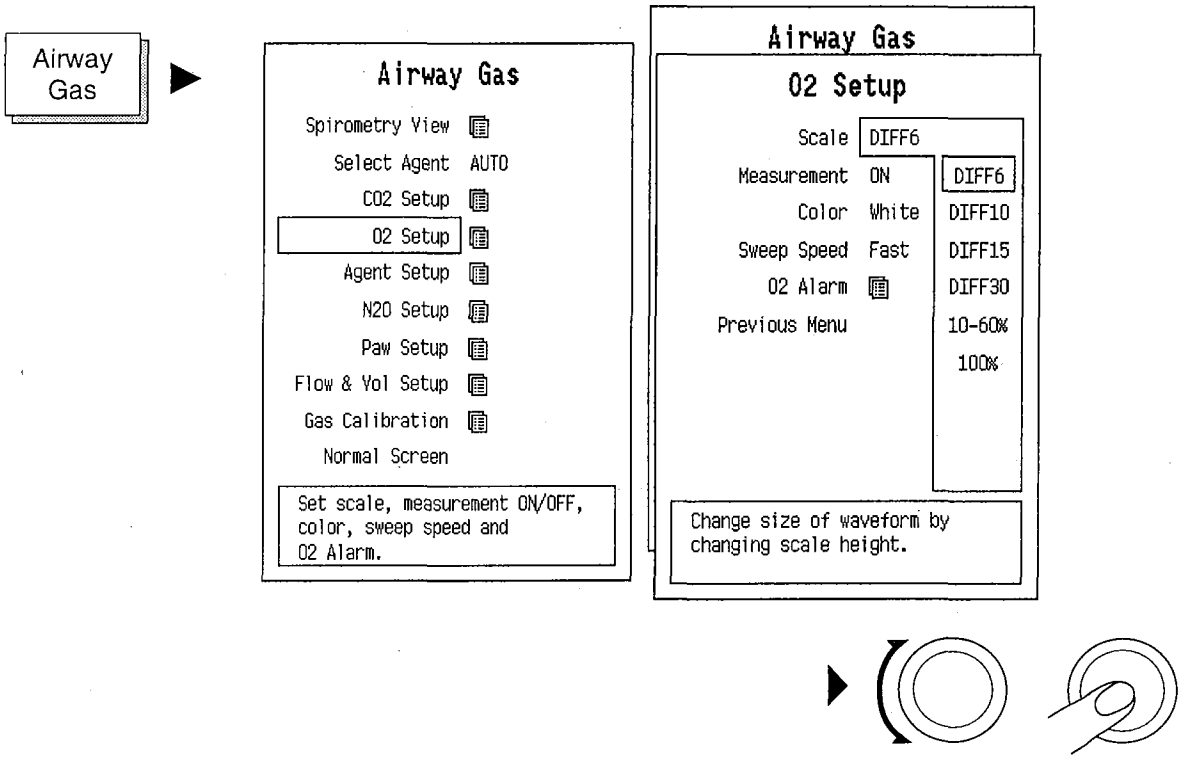
REBREATHING ALARM

Adjusts the $FiCO_2$ alarm level. The selections are 1, 2, 3 %, or OFF.

CO_2 ALARMS — Brings you to the Alarms Setup menu to change the CO_2 alarm limits.

PREVIOUS MENU — Returns you to the previous menu level.

O_2 Setup



SCALE — The Datex AS/3 Anesthesia Monitor measures inspiratory and expiratory O_2 continuously and displays O_2 waveform, oxygram. It also calculates and displays the inspired-expired O_2 difference. The scale allows you to select the following ranges for oxygram: difference scales DIFF 6, DIFF 10, DIFF 15, DIFF 30, 10 - 60 %, 0 - 100 %.

The monitor determines the maximum measured O_2 concentration and automatically sets the reference level for the difference scales.

DIFF 30 and 10 - 60% are used e.g., in recovery room when the patient is oxygenated. Scale 0 - 100 % enables to inspect the full range of O_2. It is used e.g. during preoxygenation.

MEASUREMENT

Selects ON/OFF. In cases where no O_2 alarms are desired it is possible to turn OFF the entire measurement.

If OFF is selected the message MEASUREMENT OFF is displayed in the O_2 waveform field and OFF is displayed in the digit field.

COLOR

This feature allows you to change colors for the waveform and digit field. The choices are: YELLOW, WHITE, GREEN, RED, or BLUE.

SWEEP SPEED

Selects FAST (6.25 mm/sec) or SLOW (0.62 mm/sec) speed. Slow waveforms have a sweep speed one tenth of normal, for a full screen sweep (5 minutes). Slow waveforms show changes better than fast waveforms.

O_2 ALARMS

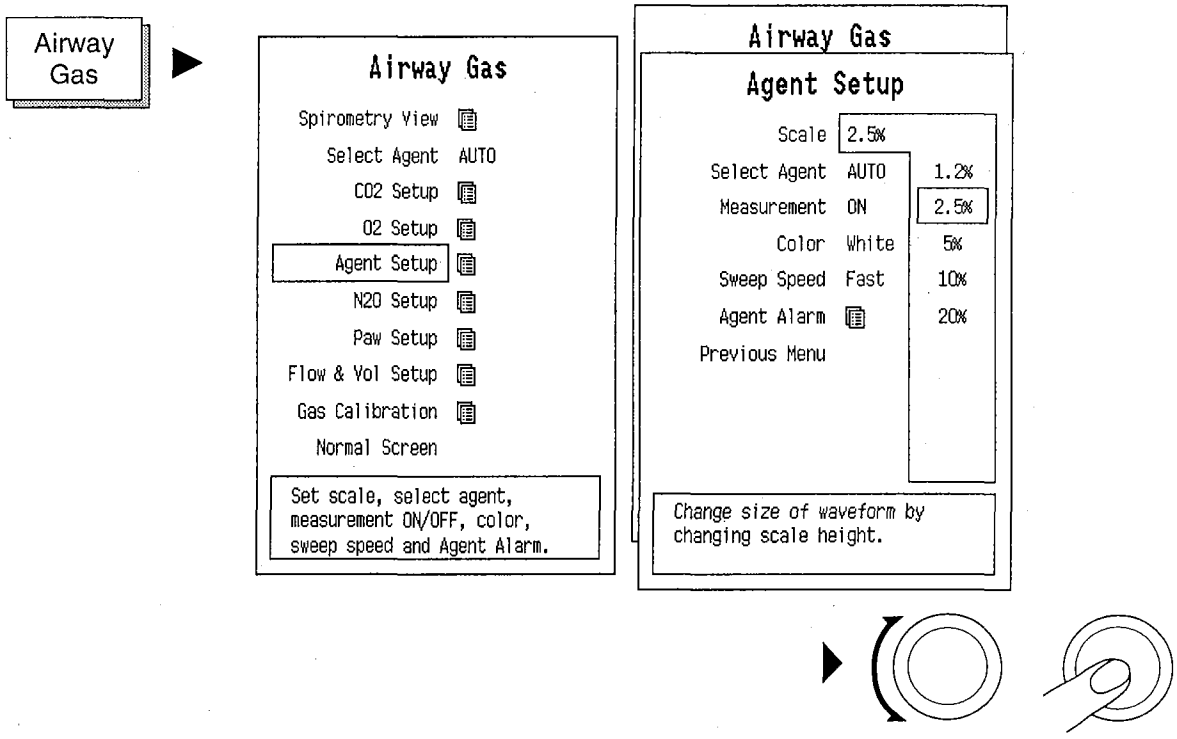
Brings you to the Alarms Setup menu to change the O_2 alarm limits.

NOTE: When this symbol is displayed beside the O_2 value FiO_2 low alarm limit is set below 21 %.

PREVIOUS MENU

Returns you to the previous menu level.

Agent Setup



SCALE

Selects the scale for anesthesia agent waveform between 0 - 1.2 %, 0 - 2.5 %, 0 - 5 %, 0 - 10 % or 0 - 20 %.

Scale 0 - 1.2 % is used with concentrations < 1 %. Scales 0 - 2.5 % and 0 - 5 % are normal scales, 0 - 5 % being used e.g., in induction. Scale 0 - 20 % is the maximum scale.

SELECT AGENT

Selects None, Halothane, Enflurane, Isoflurane, Desflurane or Sevoflurane. Select AUTO for automatic agent identification.

MEASUREMENT

Selects ON/OFF. In cases where no AA alarms are desired it is possible to turn OFF the entire measurement.

If OFF is selected the message MEASUREMENT OFF is displayed in the AA waveform field and OFF is displayed in the digit field.

COLOR

Anesthetic agents are marked with following colors:

* Enflurane: ORANGE
* Isoflurane: VIOLET
* Halothane: RED
* Desflurane: BLUE
* Sevoflurane: YELLOW

It is also possible to select WHITE or GREEN.

SWEEP SPEED

Selects FAST (6.25 mm/sec) or SLOW (0.62 mm/sec) speed. The slow waveforms have a sweep speed one tenth of normal, for a full screen sweep (5 minutes).

AGENT ALARMS

Brings you to the Alarms Setup menu to change the anesthetic agent alarms.

PREVIOUS MENU

Returns to the previous menu level.

MAC VALUES

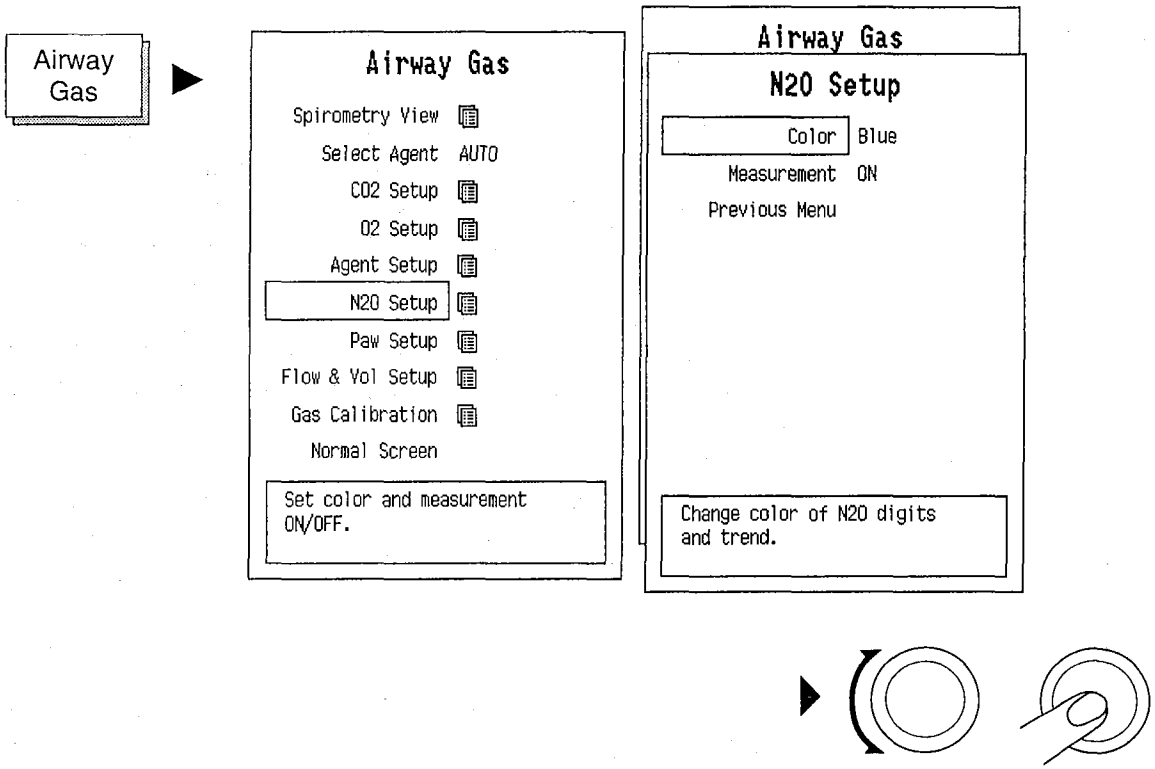
MAC value can be selected for display in Modify Digit Fields menu, see Section Monitor Setup.

Table 17-2 MAC Numbers at Different Gas Concentrations

	HAL	ENF	ISO	SEV	DES	N2O
1 MAC	0.75%	1.7%	1.15%	1.7%	6 %	100%
2 MAC	1.5%	3.4%	2.3%	3.4%	12%	
3 MAC	2.3%	5.1%	3.45%	5.1%	18%	

WARNING: Be aware that MAC values are empiric, not absolute values. The monitor's MAC values correspond to those of healthy adults and cannot be applied to children. Age and some other individual factors influencing the effect of volatile agents are not taken into account.

Setting up N_2O



COLOR — This feature allows you to change the color for the waveform and digit field: YELLOW, WHITE, GREEN, RED, or BLUE.

MEASUREMENT — Selects ON/OFF. In cases where no N_2O alarms are desired it is possible to turn OFF the entire measurement. When measurement is ON the FiN_2O alarm limit is FI x 82 %.

If OFF is selected OFF is displayed in the digit field.

PREVIOUS MENU — Returns to the previous menu level.

Automatic Agent Identification

The Airway Module G-AiO and G-AiOV, with the agent identification option will automatically identify and select Halothane, Enflurane, Isoflurane, Sevoflurane and Desflurane. It will also warn of the presence of an agent mixture.

When the monitor identifies and selects the agent, it displays a message XXX SELECTED (XXX being HAL, ENF, ISO, SEV or DES). The message will be displayed for 60 seconds. The inspiratory and expiratory concentrations of the agent will be shown in the digit field.

Minimum concentration for the identification is 0.15 vol %. The agent selection remains active, even if the concentration decreases below 0.15 vol% during the case.

Automatic agent identification will operate after the normal warm up of the Airway Module (approximately 2 minutes).

Agent Mixtures

The agent identification will warn you if a mixture of anesthetic agents is detected. The mixture warning is activated at the latest when the concentration of the minor agent is greater than 0.3 vol% and more than 15 % of the total anesthetic agent concentration.

When a mixed agent is detected, the message AGENT MIXTURE is displayed and an audible alarm is produced. The message remains active as long as the situation persist.

During an agent mixture situation the anesthetic agent concentrations and labels of two anesthetic agents are displayed.

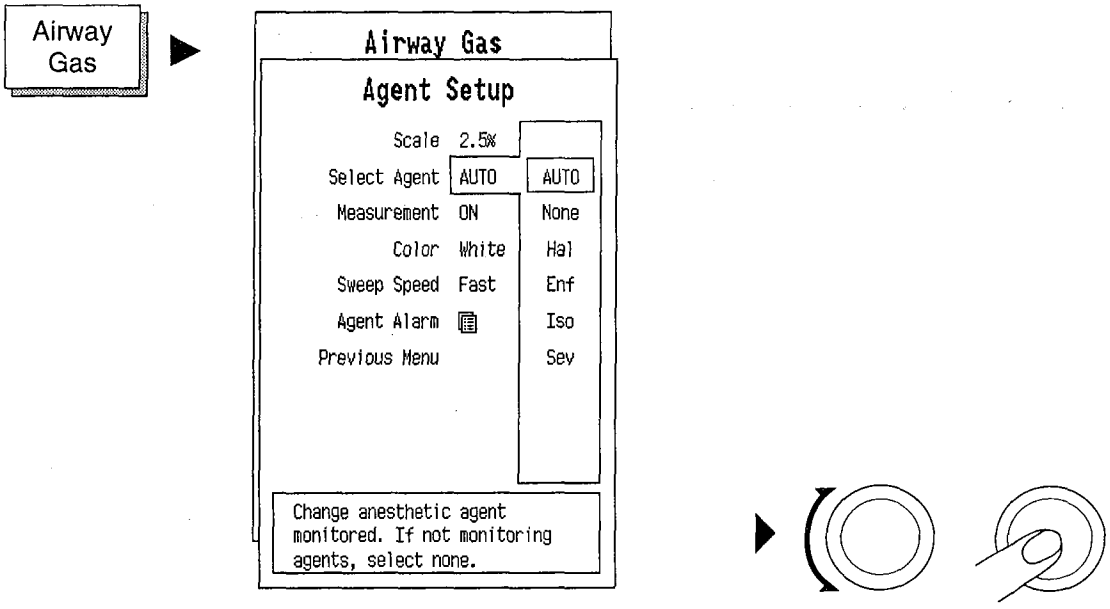
When the anesthetic agent is changed, there will be an agent mixture situation, before the first agent is washed out of the patient and the circuit. When the second agent starts to dominate the measurement is based on the new agent. The message AGENT MIXTURE disappears when the concentration of the first agent becomes insignificant. The exact limits where this event occurs, depends on the mixture agents.

NOTE: Some hydrocarbons (e.g., acetone and methane), may also cause the message AGENT MIXTURE to appear.

Manual Agent Selection with Agent ID Module

You may still manually select the agent if desired.

Automatic agent identification is activated after power up. To override automatic identification and manually select the agent:



If the manual selection differs from the automatic identification, the monitor will display the automatic identification message (e.g., HAL DETECTED). At the same time a message CHECK AGENT will be displayed. The message CHECK AGENT will remain active on the screen as long as the manual selection differs from the automatic identification.

When NONE is selected and automatic identification detects a mixture of agents, an alarm SELECT AGENT + AGENT MIXTURE is displayed.

Detection of Alcohol

The automatic agent identification can detect alcohol in the breathing circuit. Alcohol may originate from the patient's breath or from a disinfectant which contains ethanol or propane.

The anesthetic agent values are compensated in the presence of alcohol.

Miscellaneous

When the monitor is in automatic mode and it detects Calibration gas and no anesthetic agent (e.g., from Datex Quick Cal calibration gas), a message CAL GAS FOUND appears in the message field.

If the identification sensor should fail, a message AGENT ID INOP. will be displayed.

Selecting Alarm Sources

Alarm sources can be selected in the alarm sources sub menu under the Alarms Setup menu. The selections are FI or ET as the high and low alarm limit.

Alarm Messages and Limits

Table 17-3 Airway Gas Messages 1

AIRWAY GAS	
MESSAGE	**EXPLANATION**
Resp High Resp Low	Respiration rate equal or above alarm limit Respiration rate equal or below alarm limit
EtCO2 High EtCO2 Low	EtCO2 equal or above alarm limit EtCO2 equal or below alarm limit
Rebreathing	FiCO2 equal or above alarm limit
Apnea	No changes detected in CO2 during the last 20 seconds
FiO2 High FiO2 Low	FiO2 equal or above alarm limit FiO2 equal or below alarm limit
EtO2 High EtO2 Low	EtO2 equal or above alarm limit EtO2 equal or below alarm limit
FiN2O High	FiN2O equal or above 82 %
FiAA High FiAA Low	FiAA equal or above alarm limit FiAA equal or below alarm limit
EtAA High EtAA Low	EtAA equal or above alarm limit EtAA equal or below alarm limit
Select Agent	Without agent identification: Anesthetic agent detected, not selected.
Select Agent + Agent Mixture	With agent identification: Anesthetic agent mixture detected.
Occlusion	The sample tube inside or outside the monitor is blocked or the water trap is occluded. If occlusion persists, measured gas values disappear.
Air Leak	- The water trap is not connected. - The gas outlet is blocked. - There is a leak in the sampling system inside the module. If air leak persists measured gas values disappear.

Table 17-4 Airway Gas Messages 2

AIRWAY GAS	
MESSAGE	**EXPLANATION**
Check Agent AA Detected	With agent identification: Manually selected agent differs from the one identified by the monitor.
Unknown Agent	The agent identification detects more than one agent.
Calibrate Agent ID	The selfdiagnostics detects identification error. Perform gas calibration.
Replace Trap	Indicates residue build-up on the water trap membrane. This decreases air flow.
Sensor Inop.	The gas measuring sensor is inoperative or the temperature in the module has increased.
Gas-Module error	

Alarm Limits

$EtCO_2$ adjustable OFF, 0 - 15, OFF
$FiCO_2$ adjustable 1 %, 2 %, 3 %, OFF
EtO_2 adjustable 10 - 100, OFF
FiO_2 adjustable 18 - 100 , OFF
FiN_2O HIGH FIXED 82 %
Et, FiAA adjustable OFF, 0 - 15 %, OFF
RR OFF, 4 - 60 , OFF

Auto Limits

$EtCO_2$ HIGH	$EtCO_2$ + 1 %
$EtCO_2$ LOW	$EtCO_2$ - 1 %
Et, FiO_2 HIGH	Et/FiO_2 + 5 %
Et, FiO_2 LOW	Et/FiO_2 - 5 %
Et, Fi AA HIGH	Et/Fi AA + 0.5 %
Et, Fi AA LOW	Et/Fi AA - 0.5 %

Resp HIGH RR x 1.25 + 2
Resp LOW RR x 0.75 - 2

No Auto Limits

CO_2 Rebr.
N_2O

Patient Connections

WARNING: PATIENT SAFETY: Always test the sampling line adapter for a tight connection and proper operation before attaching it to a patient.

CAUTION: Use only original Datex sampling lines and accessories; other sampling lines may cause inaccurate readings and malfunctions.

Take the gas sample as close to the patient's airway as possible, as shown in the illustrations below, and connect the sampling line to the patient's airway adapter.

NOTE: Position the adapter's sampling port upwards to prevent fluid from entering the sampling line.

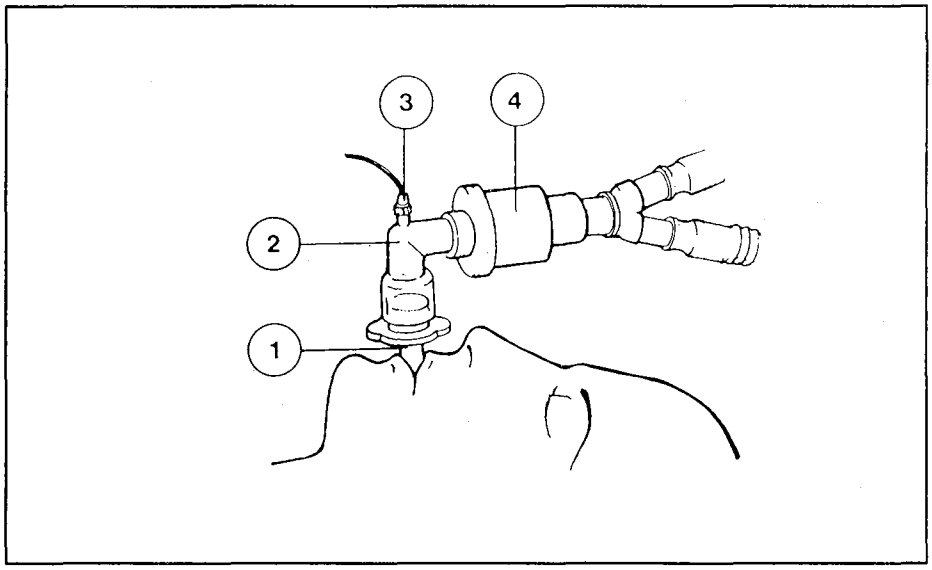


Figure 17-6 Normal Endotracheal Intubation Using a Moisture Exchanger

(1) Intubation tube with 15 mm connector
(2) Sampling line adapter
(3) Sampling line
(4) Moisture exchanger

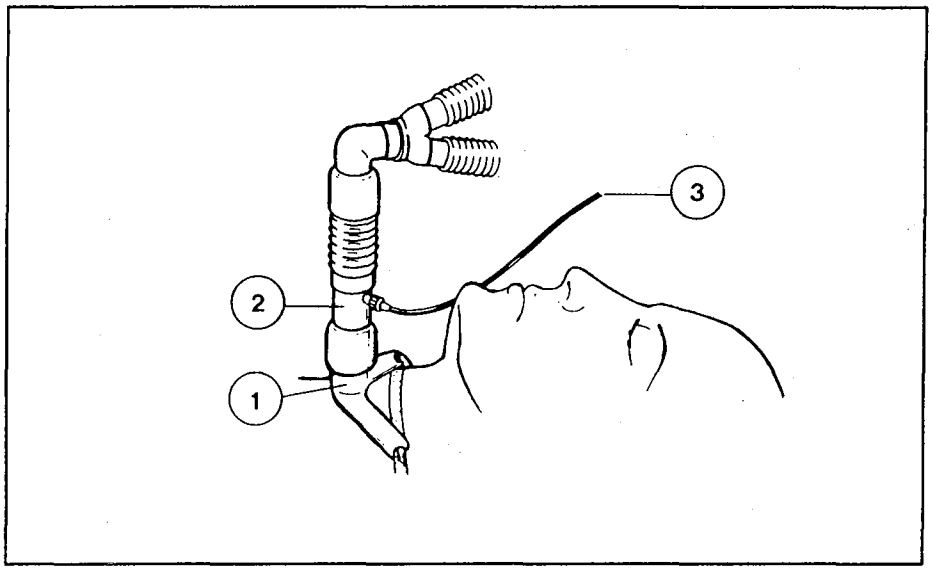


Figure 17-7 Tracheostomy

(1) Tracheostomy tube with 15 mm connector
(2) Sampling line adapter
(3) Sampling line

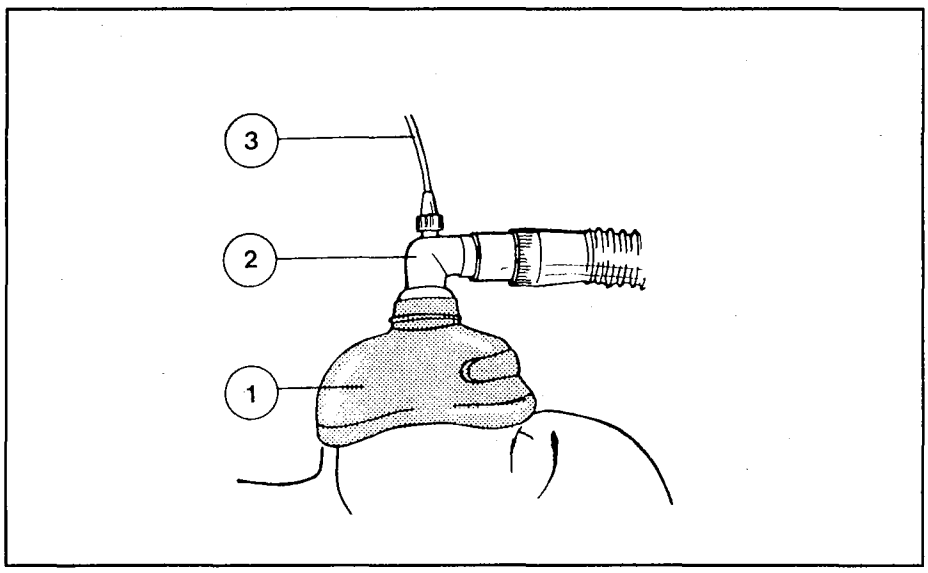


Figure 17-8 Mask Ventilation

(1) Mask
(2) Sampling line adapter
(3) Sampling line

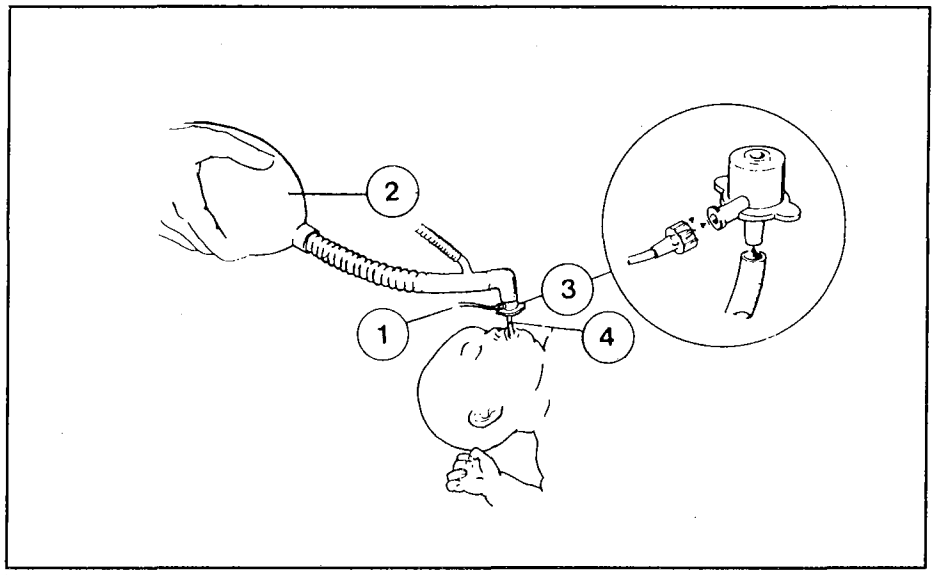


Figure 17-9 Endotracheal Intubation of Pediatric Patients

(1) Sampling line
(2) Jackson-Rees ventilation system
(3) Pediatric sampling line adapter*)
(4) Endotracheal tube

*) Replaces regular pediatric endotracheal tube connector. For sizes 2.5 to 4.0 endotracheal tubes.

Some pediatric ventilation circuits have the fresh gas inlet located so close to the airway connector that the pediatric sampling line adapters prevent proper seating.

Confirm that the water trap container is empty and properly attached to the water trap.

NOTE: Change or clean the water trap container between patients. Empty the water trap container whenever it is more than half full.

Attach a gas sampling line to the sample-in port on the water trap.

NOTE: Use Datex sampling line with the D-fend water trap.

NOTE: An occlusion alarm may result if the sampling line is attached to the water trap after the monitor is turned on.

Gas Calibration

The Airway Module should be calibrated once every six months or whenever there are indications of errors in the gas readings.

Calibrate the gas measurement with Datex calibration gas. Do not use any other calibration gases. The gas includes the following concentrations:

CO_2	5 %
N_2O	33%
O_2	55 %
AA	corresponding to 3% Enflurane

NOTE: Anesthetic agent is always calibrated with Enflurane selected. If some other agent is selected for monitoring, the selection is stored in the memory and returned when the calibration is over.

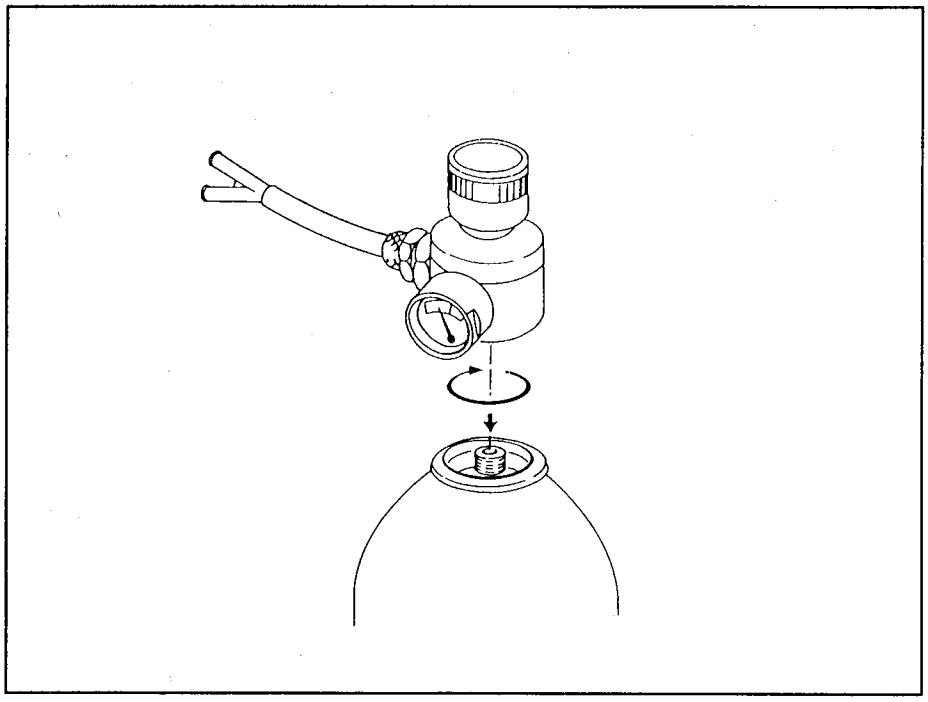


Figure 17-10 Attaching Regulator to Calibration Can

* Attach the regulator to the gas can as in the figure above. The can may be used until the pressure indicator reaches the red zone.

The regulator is either open or closed. The feeding pressure is not adjustable.

NOTE: If you use an older brass regulator, the feeding pressure should be adjusted to between 5 and 7 psi. To use an old regulator with the new aerosol cylinders requires an adapter available from Datex.

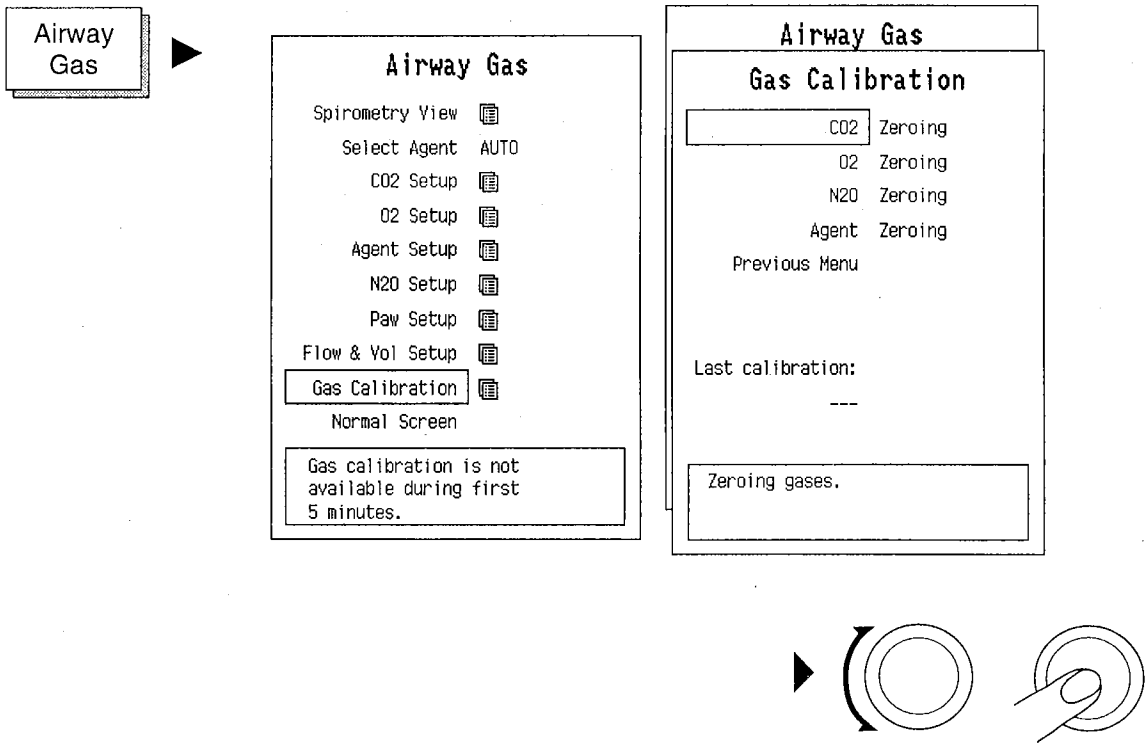
For ordering details see the attached Datex Supplies and Accessories catalogue.

Starting Calibration

* Attach the sampling line to the connector on the water trap. Leave the other end unattached.

* Turn on the power and wait at least five minutes for the monitor to warm up. After five minutes, you may begin calibration using the Airway Gas Setup menu (the text CALIBRATION remains grey as long as the message GAS CALIBRATING GAS SENSOR is displayed).

For maximum accuracy, a warm up time of 30 minutes is recommended.



* Press the AIRWAY GAS key on the Command Board.

* Rotate the ComWheel to highlight GAS CALIBRATION and press.

The message ZEROING will be displayed. ZERO OK should appear after each gas is zeroed.

If the message ZERO ERROR is displayed, press the NORMAL SCREEN key on the Command Board and repeat the calibration procedure.

NOTE: Autozeroing intervals are: after start up, 5 min, 5 min, 5 min, 15 min, 15 min, 15 min, thereafter every hour. Autozeroing may also occur after agent selection.

If the problem persists, contact authorized service personnel.

* Wait until the message FEED GAS is displayed.

* Connect the sampling line to the gas valve and open it to feed the calibration gas. Feed the calibration gas until a message ADJUST for every gas is displayed, then close the valve.

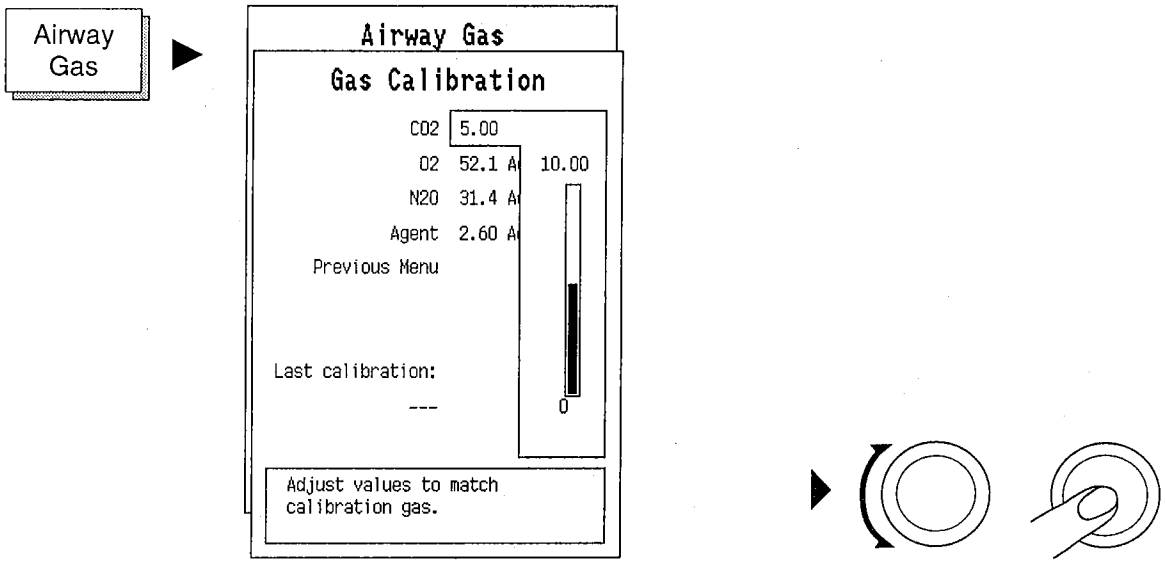
  Confirm that the displayed gas values match the concentration marked on the calibration gas can.

If adjustments are required:

* Rotate the ComWheel to highlight the first gas to be adjusted and press.

* Rotate the ComWheel until the displayed value matches the desired value and press.

  Repeat these two steps for each gas.



NOTE: During gas calibration, % units are always used for CO_2 regardless of selected measuring units.

NOTE: If separate gas cylinders are used, each gas must be calibrated separately.

The time of the last calibration is shown at the bottom of the menu page.

* Select PREVIOUS MENU to return to the previous menu level.

Sample Gas Exhaust

When N_2O and/or volatile anesthetics are used, pollution of the operation room by these gases should be prevented. Connect the sample gas outlet of the monitor to the scavenging system or return it to the patient circle.

Connect the sample gas outlet of the monitor to the scavenging system either

- through the ventilator reservoir (see figure below)
- directly to the scavenging tube using a T-fitting. (see figure on next page)

Connect sample gas outlet only to open scavenging system where gas is removed in room pressure.

CAUTION: Strong suction may change the operating pressure of the monitor and cause inaccurate readings or internal damage.

Scavenging Through Reservoir

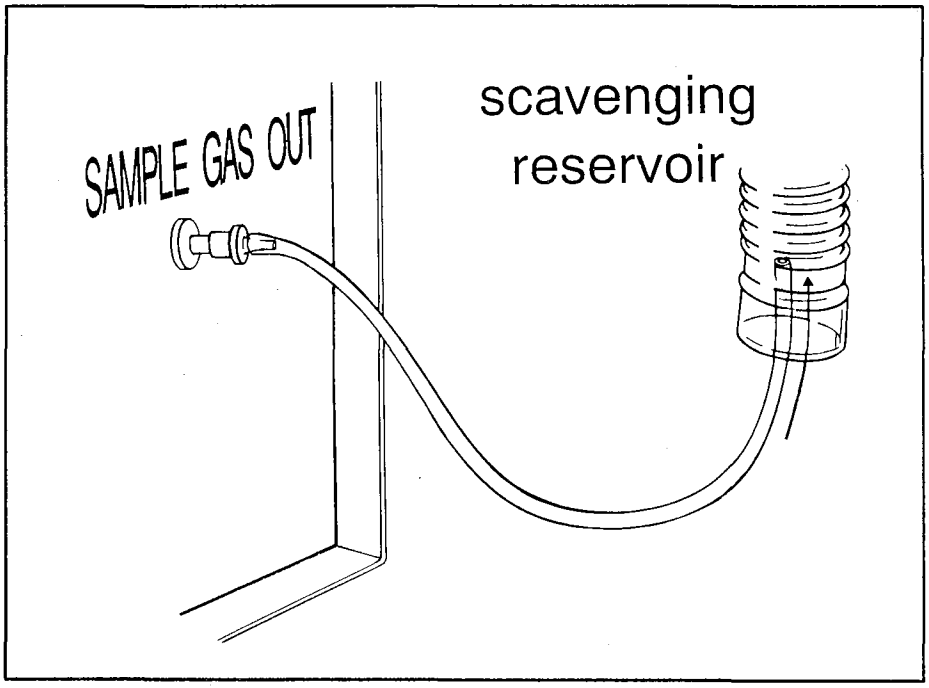


Figure 17-11 Connection through ventilator reservoir

* Connect an exhaust line to the sample gas outlet at the monitor's rear panel.

* Attach the other end of the line to the ventilator reservoir. Make sure that the reservoir tube diameter must be at least 2-3 times larger than the exhaust line.

Connection Directly to the Scavenging Tube

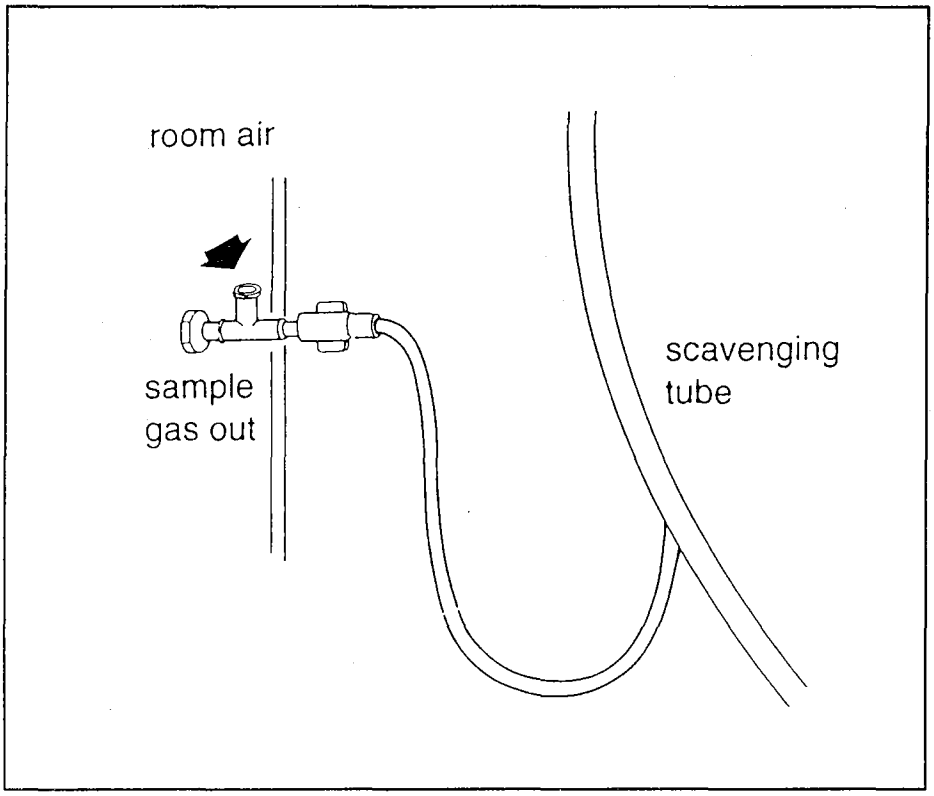


Figure 17-12 Connection directly to a scavenging system

* Connect a T-fitting between the monitor and the exhaust line.

* Attach the other end of the line to the scavenging tube.

Datex

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18 SIDE STREAM SPIROMETRY

Overview of Side Stream Spirometry

The Airway Module with Side Stream Spirometry option (G-OV, G-AiOV, G-AOV) enables monitoring of the real patient ventilation. The Datex AS/3 Anesthesia Monitor monitors both the operation of the ventilator and patient's respiratory mechanics.

Side Stream Spirometry measures the airway pressures using the D-lite and Pedi-lite sensors which are also used for gas sampling . The measured pressure is transferred to the monitor through a spirometry tube.

Measured Parameters

Tidal volume (TV) (expiratory and inspiratory values).

Minute volume (MV) (expiratory and inspiratory values).

Airway pressure
- Peak pressure (Ppeak)
- Plateau pressure (plateau)
- End expiratory pressure (PEEP)
- Real-time pressure waveform

Flow — Real time waveform

V1.0 Volume expired during the first second (adult mode)

V0.5 Volume expired during the first 0.5 seconds (pediatric mode)

Compliance (Compl.)

Inspiratory time : expiratory time (I:E)

Pressure-volume loop (Paw-Vol loop)

Flow-volume loop (Flow-Vol loop)

Display of Side Stream Spirometry

Continuous Waveforms

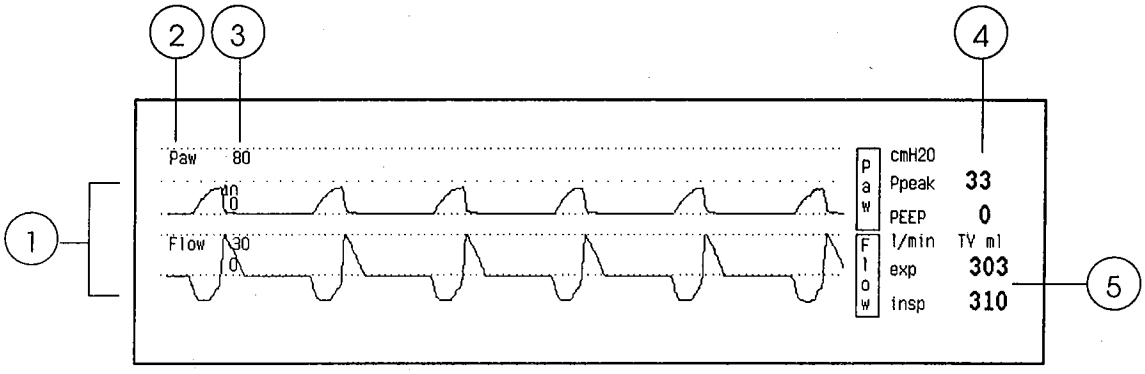


Figure 18-1 Side Stream Spirometry Display

(1) Pressure and flow waveforms
(2) Label
(3) Scale
(4) Digit field for Ppeak and PEEP values
(5) Digit field for tidal or minute volume

Lower Digit Field

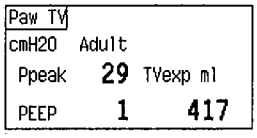


Figure 18-2 Digit Field for Paw and TV. Selection Between Minute and Tidal Volume Values is Done in the Airway Gas/Flow&Vol Setup Menu.

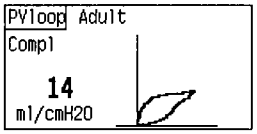


Figure 18-3 Digit Field with a Pressure Volume Loop and the Compliance. The Compliance Value and the Loop are Drawn Every Breath.

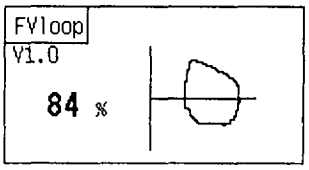


Figure 18-4 Digit Field With a Flow Volume Loop and the Percent of the Total Volume Expired During the First Second (V1.0). The Value and the Loop are Updated Every Breath.

Module Description

Side Stream Spirometry measurement is housed in Airway Modules G-OV, G-AOV and G-AiOV.

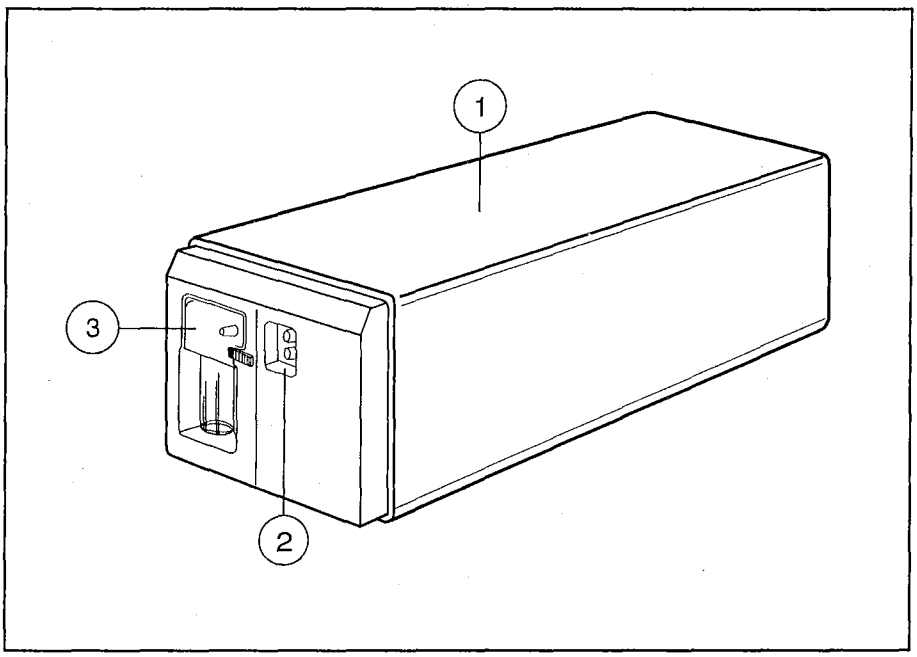


Figure 18-5 Airway Module with Side Stream Spirometry

(1) Airway Module chassis
(2) Side Stream Spirometry connector
(3) D-fend water trap with gas sampling connector

Start Up

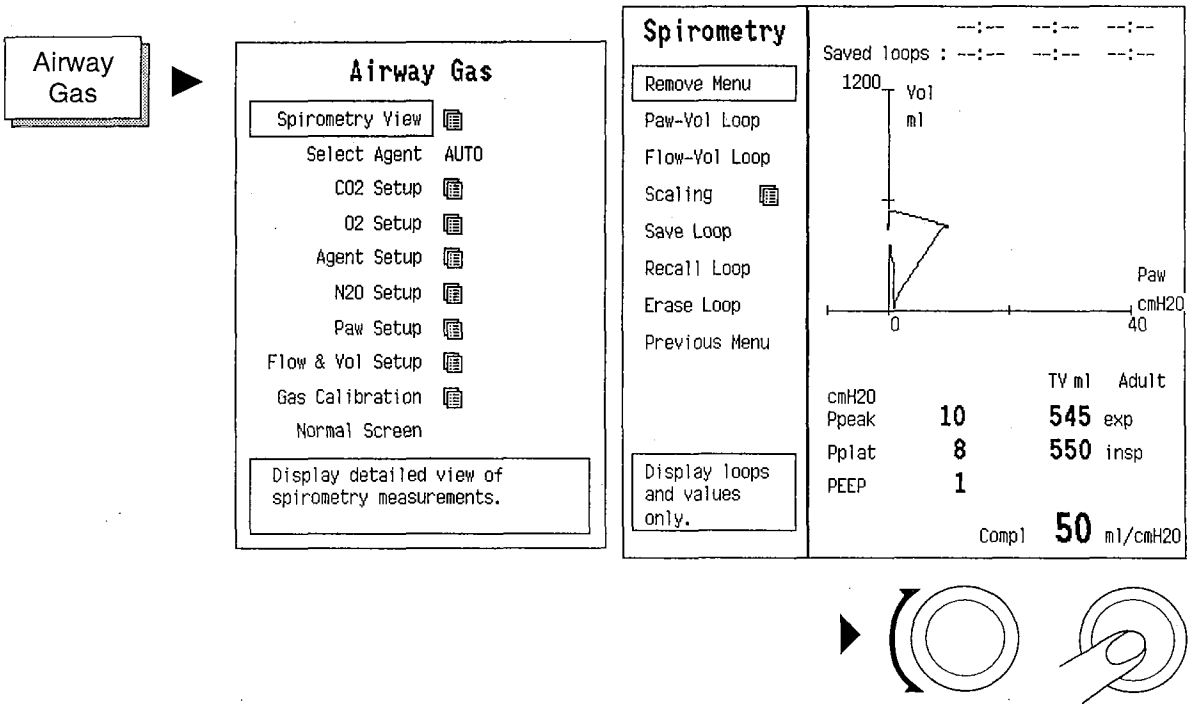
* Check that the Airway Module with Side Stream Spirometry measurement is installed and connected to the Central Unit of the Datex AS/3 Anesthesia Monitor.

* Connect the spirometry tube to the D-lite (adult) or Pedi-lite sensor (pediatrics 3-30 kg) and the pressure connector on the Airway Module.

* Select the correct sensor type in the monitor settings.

Spirometry View

Observing of spirometric parameters can be done with the SPIROMETRY VIEW display



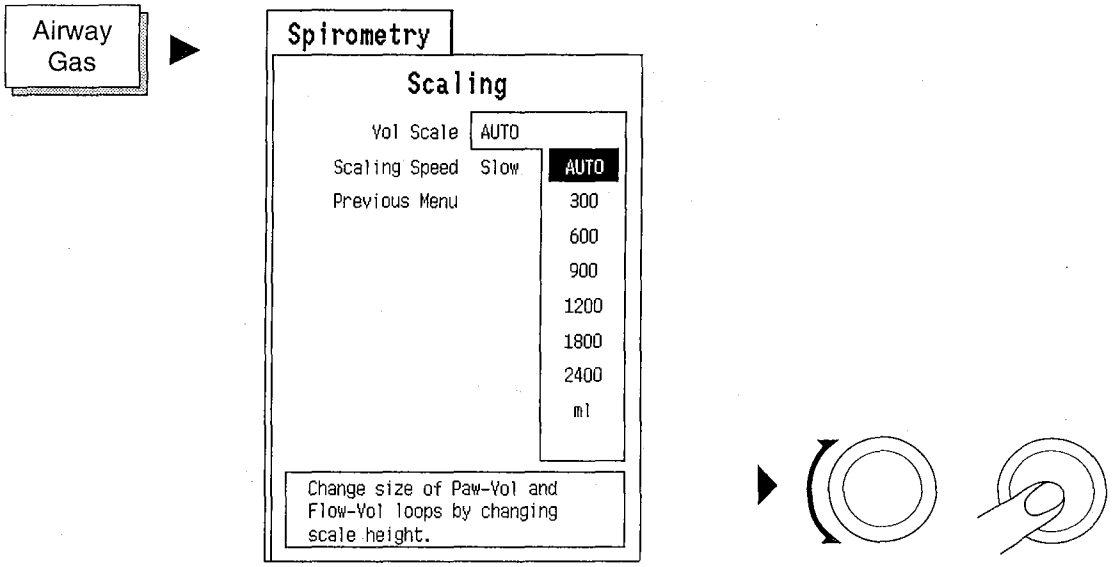
REMOVE MENU — The menu field on the left can be hidden by selecting Remove Menu. This gives more space for displaying measured information. Press ComWheel once to make the menu reappear.

Paw-Vol LOOP — Selects pressure-volume loop for display. An angle of 45°is equal to a compliance of 30 ml/cmH_2O for adults and 10 ml/H_2O for pediatrics.

With pediatric measurement the ratio of the loop axis is changed to maintain the normalized 45° loop slope also in pediatric measurement.

Flow-Vol LOOP — Selects flow-volume loop for display.

SCALING — Changes the size of the Paw-Vol and Flow-Vol loops. Scaling speed changes the speed at which the loops are rescaled during AUTO scaling. Use fast scaling speed for manual ventilation.



SAVE LOOP — Saves up to six loops in the memory. After this the newest one will be overwritten. When six loops are saved a red warning is displayed "Next save will overwrite last"

The saving time appears on the upper corner of the Spirometry View. Which saved loop is currently displayed, is indicated by a frame around the time.

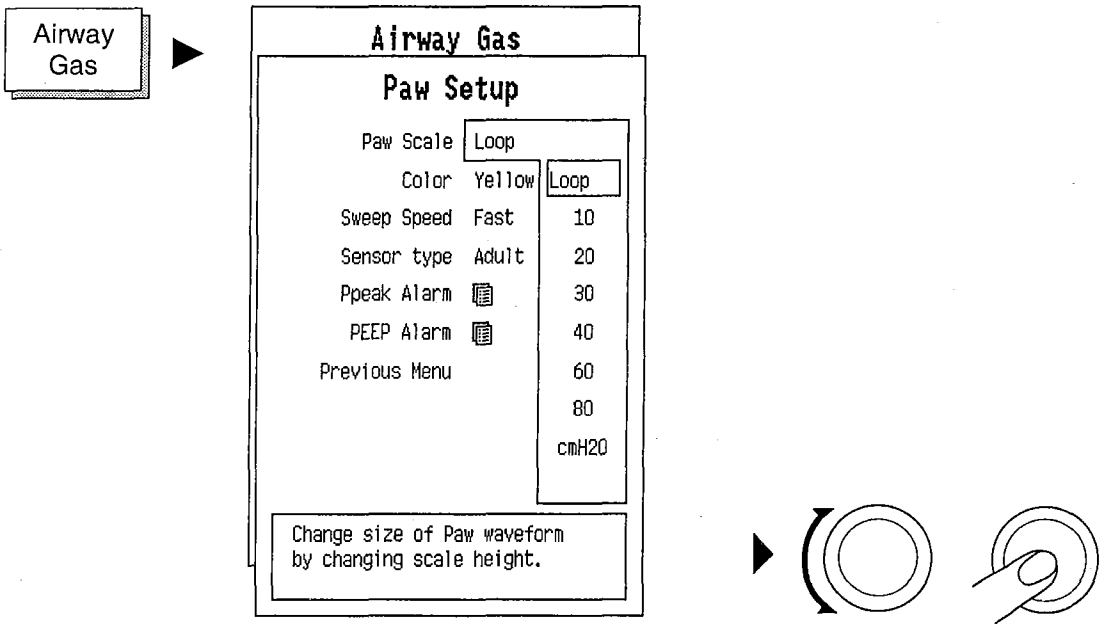
RECALL LOOP — Recalls the selected loop from memory. One real time loop and one saved loop can be displayed simultaneously. The saved loop is displayed with a dotted line.

ERASE LOOP — Erases the selected loop from memory.

PREVIOUS MENU — Returns you to the previous menu level.

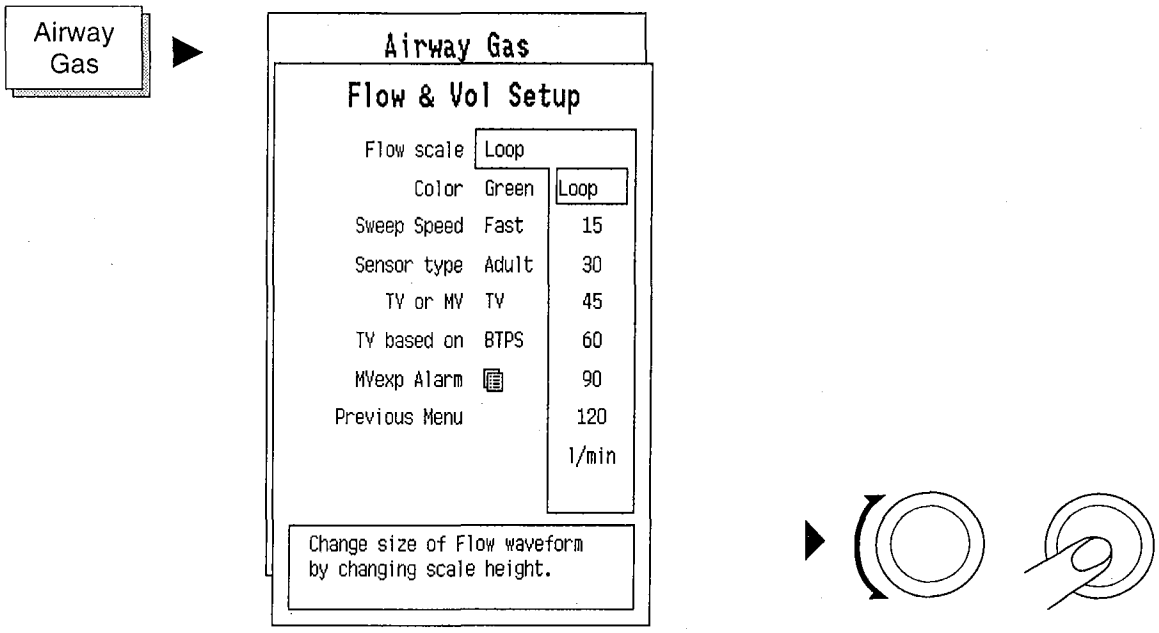
Paw Setup

Spirometry settings are done in the menus Paw Setup and Flow&Vol Setup under Airway Gas menu.



Paw SCALE	Changes airway pressure waveform size by changing the scale. The waveform scale is the same as the Paw scale in the loop.
COLOR	Allows you to change the color of the waveform and digit field: YELLOW, WHITE, GREEN, RED, or BLUE.
SWEEP SPEED	Selects FAST (6.25 mm/sec) or SLOW (0.62 mm/sec) drawing of waveforms.
SENSOR TYPE	To select either adult or pediatric flow sensor.
Ppeak ALARM	Calls up the Alarm Setup menu to change peak pressure alarms.
PEEP ALARM	Calls up the Alarm Setup menu to change end expiratory pressure alarms.
PREVIOUS MENU	Returns you to the previous menu level.

Flow and Volume Setup



Flow SCALE	Changes flow waveform size by changing the scale. The waveform scale is the same as the Flow scale in the loop.
COLOR	Allows you to change the color of the waveform and digit field: YELLOW, WHITE, GREEN, RED, or BLUE.
SWEEP SPEED	Selects FAST (6.25 mm/sec) or SLOW (0.62 mm/sec) drawing of waveforms.
SENSOR TYPE	To select either adult or pediatric flow sensor.
TV or MV	Selects minute or tidal volume to be displayed in the digit field.
TV BASED ON	To specify measuring conditions of pressure, temperature and humidity for volume measurement.
MVexp ALARM	Calls up the Alarm Setup menu to change minute volume alarms.
PREVIOUS MENU	Returns you to the previous menu level.

Alarm Messages and Limits

Table 18-1 Side Stream Spirometry Messages

SIDE STREAM SPIROMETRY	
MESSAGE	**EXPLANATION**
Obstruction	Peak pressure high, may indicate impaired air flow in the patient airway.
Disconnection	Disconnection in the patient's airway.
Leak	Peak pressure or expiratory minute volume low, indicates leak in the airway.
Ppeak high/low	Measured peak pressure value above/below the set pressure limit.
PEEP high/low	Measured PEEP value above/below the set pressure limit.
MVexp high/low	Measured expiratory minute volume value above/below the set volume limit.

Alarm Limits

Ppeak	adjustable -20 - 100 cmH_2O , Off
PEEP	adjustable 0 - 60 cmH_2O, Off
MVexp	adjustable 1 - 30 l, Off

Auto Limits

Ppeak high	Ppeak +10 cmH_2O
Ppeak low	Ppeak -10 cmH_2O
PEEP high	PEEP +5 cmH_2O
PEEP low	not applicable
MVexp high	MVexp +2 l
MVexp low	MVexp -2 l

Sensor Attachment

Adult and pediatric patients are measured with different sensors. Select the correct sensor type in the monitor settings.

Adult D-lite Sensor

The D-lite sensor is intended for adult patients or patients weighing more than 20 kilograms and having a respiratory rate from 4 to 30 breaths per minute. The reusable D-lite sensor is transparent yellow and the disposable D-lite sensor is non-transparent yellow.

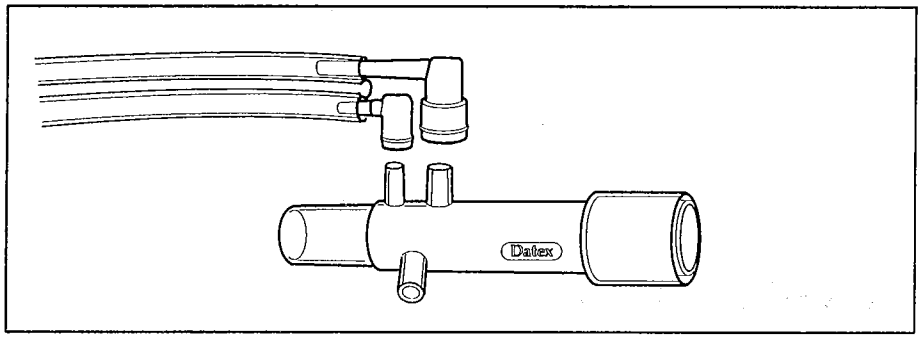


Figure 18-6 D-lite Sensor

Pediatric Pedi-lite Sensor

The Pedi-lite sensor is intended for pediatric patients weighing between 3 and 30 kilograms and having a respiratory rate from 4 to 50 breaths per minute. Pedi-lite is available only as a reusable sensor. The sensor is transparent yellow.

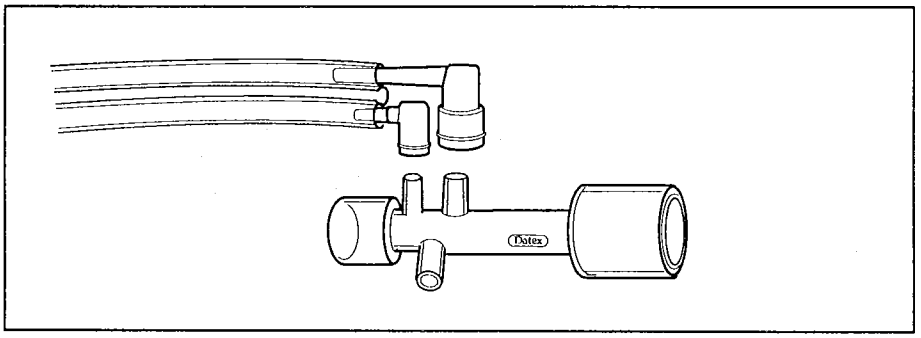


Figure 18-7 Pedi-lite Sensor

Spirometry Sensor and Tube Connections

Both the D-lite and the Pedi-lite sensors work also as airway adapters with a connector for airway gas monitoring.

* Connect the Spirometry tube to the D-lite or Pedi-lite sensor by inserting the longer end onto the larger nipple and the shorter end onto the smaller nipple of the D-lite sensor.

* Connect a gas sampling line to the third nipple on the other side of the D-lite or Pedi-lite sensor.

* Connect the other end of the Spirometry tube to the pressure connectors on the Airway Module.

* Connect the other end of the gas sampling line to the D-fend water trap.

The gas sampling line can be inserted into the grove of the Spirometry tube for a neater setup.

To Attach D-lite Sensor to Patient

The D-lite and the Pedi-lite sensors are designed with a 15 mm inner diameter for the endotracheal tube connector and 15 mm outer diameter to connect to the breathing circuit.

The 22 mm outer diameter of the patient end also allows you to connect D-lite sensor to a mask.

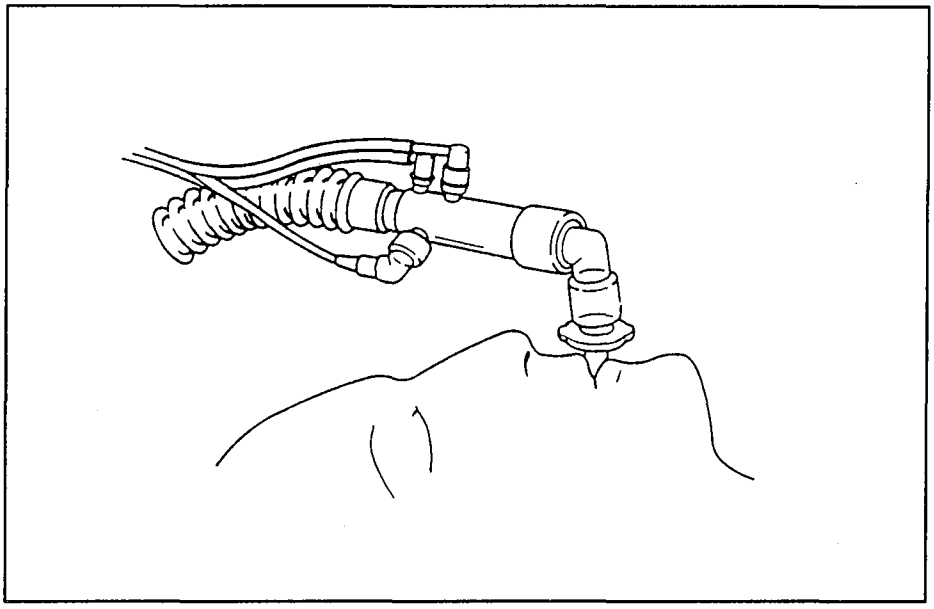


Figure 18-8 Normal Endotracheal Intubation and D-lite Sensor

* Connect the sensor to the endotracheal tube or to the mask.

* Attach the breathing circuit to the other end of the sensor.

* Confirm that all the connections are secure.

* Confirm that you are using the correct sensor mode (adult or pediatric). To change the mode push Airway Gas key, select Flow & Vol Setup and then sensor Type.

NOTE: Do not cut the spirometry tube. Cutting may lead to incorrect attachment and erroneous readings.

NOTE: When using a Bain circuit, the inspiratory volumes will be erroneously high. This can be corrected by using a filter between D-lite sensor and the circuit.

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Datex

PREVENTATIVE MAINTENANCE SCHEDULE

Datex Technical Support recommends the following Preventative Maintenance for all monitors equipped with a D-fend water separation system:

- **Replace D-fend:** At a minimum, every sixty (60) days, or if the **REPLACE TRAP** message is displayed on the monitor.

  [**NOTE**: High humidity cases or bronchodilators will shorten the lifespan of the D-fend water traps]

- **Replace Fan Filter:** Check regularly, replace when contaminated.

- **Replace Internal Nafion Tubes:** Annually.

By adhering to a Preventative Maintenance Schedule, you will minimize downtime of your Datex monitor, and extend the life of the monitors internal gas analyzers.

Datex Technical Support has P.M. Kits available for your monitor, please call for part numbers and prices.

Attention: Failure to adhere to Preventative Maintenance Schedule could affect the terms of your warranty.

TECHNICAL SUPPORT 1-800-555-2712

March 1995

Datex

AS/3 Anaesthesia Monitor Default Configuration Worksheet, Related to Software Cartridges, S-STD94 and S-ARK94

Before the configuration, preferably fill in the Default Configuration Worksheet to facilitate future reconfiguration. Fill in the workseet according to following procedures.

1. Tick off the functions and parameters that you will reconfigure and enter a desired default selection. The factory defaults are enclosed in brackets.

2. Enter the monitor serial number, the current date and your signature.

3. Save the worksheet for future reference.

Monitor s/n : _____

Date : _____

Signature : _____

Datex

Monitor Setup		
Parameter	**Default Selection**	**User Default**
Cardiac Bypass	(OFF) ON	
Screen 1 Setup		
Normal Screen	(Waves) Trend	
Show Menus on	Scr1 Scr2 (Scr1&2)	
Show Messages on	Scr1 Scr2 (Scr1&2)	
Screen 1 Setup / Waveform Fields		
Field 1	OFF (ECG1) P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 2	OFF ECG1 (ECG2) P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 3	OFF ECG1 ECG2 ECG3 (P1) P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 4	OFF ECG1 ECG2 ECG3 P1 (P2) P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 5	OFF ECG1 ECG2 ECG3 P1 P2 P3 P4 (PLETH) CO2 O2 AA Paw Flow	
Field 6	OFF ECG1 ECG2 ECG3 P1 P2 P3 P4 PLETH (CO2) O2 AA Paw Flow	
Combine Pressures	(YES) NO	
Screen 1 Setup / Digit Fields		
Lower Field 1	OFF HR ST P1 P2 P3 P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA (Gases) MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Lower Field 2	OFF HR ST P1 P2 P3 P4 PCWP (NIBP) SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Lower Field 3	OFF HR ST P1 P2 P3 P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop (T1+T2) T3+T4 T1 T2 T3 T4 Tblood SO2	

Datex

Monitor Setup		
Parameter	**Default Selection**	**User Default**
Lower Field 4	OFF HR ST P1 P2 (P3) P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Screen 2 Setup		
Normal Screen	(Waves) Trend	
Show Menus on	Scr1 Scr2 (Scr1&2)	
Show Messages on	Scr1 Scr2 (Scr1&2)	
Screen 2 Setup / Waveform Fields		
Field 1	OFF (ECG1) P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 2	OFF ECG1 (ECG2) P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 3	OFF ECG1 ECG2 ECG3 (P1) P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 4	OFF ECG1 ECG2 ECG3 P1 (P2) P3 P4 PLETH CO2 O2 AA Paw Flow	
Field 5	OFF ECG1 ECG2 ECG3 P1 P2 P3 P4 (PLETH) CO2 O2 AA Paw Flow	
Field 6	OFF ECG1 ECG2 ECG3 P1 P2 P3 P4 PLETH (CO2) O2 AA Paw Flow	
Combine Pressures	(YES) NO	
Screen 2 Setup / Digit Fields		
Lower Field 1	OFF HR ST P1 P2 P3 P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA (Gases) MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Lower Field 2	OFF HR ST P1 P2 P3 P4 PCWP (NIBP) SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	

Datex

Monitor Setup		
Parameter	**Default Selection**	**User Default**
Lower Field 3	OFF HR ST P1 P2 P3 P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop (T1+T2) T3+T4 T1 T2 T3 T4 Tblood SO2	
Lower Field 4	OFF HR ST P1 P2 (P3) P4 PCWP NIBP SpO2 SpO2+T CO2 O2 AA Gases MAC C.O. C.I. Paw Flow Paw TV PVloop FVloop T1+T2 T3+T4 T1 T2 T3 T4 Tblood SO2	
Set Time and Date		
Clock Format	12 (24)	
Install/Service		
Power Frequency	(50 Hz) 60 Hz	
Screen 2	(HiRes) VGA	
Install/Service / Units		
Temperature	(°C) °F	
CO2	(%) kPa mmHg	
CO2 Numbers	(Dry) Wet	
Height	(cm) in	
Weight	(kg) lb	
I:E	(-) % sec	
Paw	kPa (cmH2O) mmHg mbar	
Install/Service / Service View / Monitor		
Language	Selection depends on the software cassette adaption.	
Install/Service / Interfacing		
Gases	(Module) AGM CNO-103 CD-200 CD2-O2 SC SCO ULT ULT/al CC/CG	
SpO2	(Module) M-NSAT ULT ULT/al CC/CG SC SCO OS-123 OSE-123 OSP-200 N-100 N-200	

Datex

Monitor Setup		
Parameter	**Default Selection**	**User Default**
NIBP	(Module) 1846SX	
Spirometry	(Module) ULT	
SO2/C.O.	(None) Oxim.3	
Install/Service / Analog Outputs		
Channel 0	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 1	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 2	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 3	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 4	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 5	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	

Monitor Setup		
Parameter	**Default Selection**	**User Default**
Channel 6	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	
Channel 7	(OFF) HR ECG1 ECG2 ECG3 P1 lre P2 lre P3 lre P4 lre P1 hre P2 hre P3 hre P4 hre Pleth SpO>40 SpO>60 SpO>80 CO2 AA O2 N2O Paw Flow Vol T1 T2 T3 T4 -5V 0V +5V TEST1 TEST2	

Alarms Setup				
Parameter		**Min-Max Limit**	**Factory Default**	**User Default**
Adjust Limits				
Inv-P1				
Sys	High Low	300 OFF OFF -40	180 80	
Mean	High Low	300 OFF OFF -40	140 60	
Dia	High Low	300 OFF OFF -40	100 40	
Inv-P2				
Sys	High Low	300 OFF OFF -40	20 5	
Mean	High Low	300 OFF OFF -40	15 0	
Dia	High Low	300 OFF OFF -40	10 -5	
Inv-P3				
Sys	High Low	300 OFF OFF -40	40 10	
Mean	High Low	300 OFF OFF -40	30 5	
Dia	High Low	300 OFF OFF , -40	20 5	
Inv-P4				
Sys	High Low	300 OFF OFF -40	40 10	
Mean	High Low	300 OFF OFF -40	30 5	
Dia	High Low	300 OFF OFF -40	20 5	
Art				
Sys	High Low	300 OFF OFF -40	180 80	
Mean	High Low	300 OFF OFF -40	140 60	

Alarms Setup				
Parameter		**Min-Max limits**	**Factory defaults**	**User defaults**
Dia	High Low	300 OFF OFF -40	100 40	
ABP				
Sys	High Low	300 OFF OFF -40	180 80	
Mean	High Low	300 OFF OFF -40	140 60	
Dia	High Low	300 OFF OFF -40	100 40	
CVP				
Sys	High Low	300 OFF OFF -40	20 5	
Mean	High Low	300 OFF OFF -40	15 0	
Dia	High Low	300 OFF OFF -40	10 0	
PA				
Sys	High Low	300 OFF OFF -40	40 10	
Mean	High Low	300 OFF OFF -40	30 5	
Dia	High Low	300 OFF OFF -40	20 5	
RAP				
Sys	High Low	300 OFF OFF -40	20 5	
Mean	High Low	300 OFF OFF -40	15 0	
Dia	High Low	300 OFF OFF -40	10 0	
RVP				
Sys	High Low	300 OFF OFF -40	40 10	

Alarms Setup				
Parameter		**Min-Max limits**	**Factory defaults**	**User defaults**
Mean	High Low	300 OFF OFF -40	35 5	
Dia	High Low	300 OFF OFF -40	20 0	
LAP				
Sys	High Low	300 OFF OFF -40	30 5	
Mean	High Low	300 OFF OFF -40	20 5	
Dia	High Low	300 OFF OFF -40	20 0	
ICP				
Sys	High Low	300 OFF OFF -40	20 0	
Mean	High Low	300 OFF OFF -40	15 0	
Dia	High Low	300 OFF OFF -40	10 0	
Et CO2	High Low	15 OFF OFF 0	8.0% 3.0%	
Rebreathing Alarm		1 2 3 OFF	3%	
Fi O2	High Low	100 OFF 18	OFF 18%	
Et O2	High Low	100 OFF 10	OFF 10%	
Fi N2O			82%	N.A.
Fi AA	High Low	15 OFF 0	5.0% OFF	
Et AA	High Low	15 OFF 0	3.0% OFF	
Fi Hal	High Low	15 0	2.2% OFF	
Et Hal	High Low	15 0	1.5% OFF	

Alarms Setup				
Parameter		**Min-Max limits**	**Factory defaults**	**User defaults**
Fi Enf	High Low	15 0	5.1 % OFF	
Et Enf	High Low	15 0	3.4 % OFF	
Fi Iso	High Low	15 0	3.4 % OFF	
Et Iso	High Low	15 0	2.3 % OFF	
Fi Des	High Low	30 0	18.0 % OFF	
Et Des	High Low	30 0	12.0 % OFF	
Fi Sev	High Low	15 0	5.1 % OFF	
Et Sev	High Low	15 0	3.4 % OFF	
Respiration Rate	High Low	60 OFF OFF 4	OFF OFF	
P Peak cmH2O	High Low	100 -20	40 OFF	
PEEP cmH2O	High Low	60 0	10 OFF	
MV exp	High Low	30 1	OFF OFF	
HR	High Low	250 30	160 40	
Pulse Oximetry	High Low	100% OFF 50%	OFF 90	
NIBP				
Sys	High Low	265 OFF OFF 30	180 80	
Mean	High Low	265 OFF OFF 30	140 60	
Dia	High Low	265 OFF OFF 30	100 40	

Alarms Setup		
Parameter	**Default Selection**	**User Default**
Alarm Sources		
P1	(Sys) Dia mean OFF	
P2	Sys Dia mean (OFF)	
P3	Sys Dia mean (OFF)	
P4	Sys Dia mean (OFF)	
Art	(Sys) Dia mean OFF	
ABP	Sys Dia mean (OFF)	
CVP	Sys Dia mean (OFF)	
PA	Sys Dia mean (OFF)	
RAP	Sys Dia mean (OFF)	
RVP	Sys Dia mean (OFF)	
LAP	Sys Dia mean (OFF)	
ICP	Sys Dia mean (OFF)	
NIBP	(Sys) Dia mean OFF	
O2	Et (Fi)	
AA	Et (Fi)	
Alarm Volume		
Alarm Volume	(5) 1-10	
Audio ON/OFF		
Reminder Volume	(5) 0-10	

ECG		
Parameter	**Default Selection**	**User Default**
ECG1 Lead		
3 Lead Cable	I (II) III	
5 Lead Cable	I (II) III aVR aVL aVF V	
ECG2 Lead		
3 Lead Cable	Casc	
5 Lead Cable	I II III aVR aVL aVF (V) Casc	
ECG3 Lead		
3 Lead Cable	Casc	
5 Lead Cable	I II III (aVR) aVL aVF V Casc	
Size	(1) 0.2-5.0	
Beat Sound Volume	(3) 0-10	
ECG Setup		
Sweep Speed	12.5 (25) 50	
HR Source	(AUTO) ECG Pleth	
Filter	(Monit) Diagn STfilt	
ECG Cable Type	(3 lead) 5 lead	
Grid	ON (OFF)	
Pacemaker	Show (Hide) On R	
Colour	Yellow White (Green) Red Blue	
QRS Type	(Normal) Wide	N.A.

Pulse Oximetry		
Parameter	**Default Selection**	**User Default**
Beat Sound Volume	(3) 0-10	
Scale	AUTO 50 (20) 10 5 2	
SpO2/Pleth Setup		
Sweep Speed	12.5 (25) 50	
HR Source	(AUTO) ECG Pleth	
SpO2 Response	B-to-B Normal (Slow)	
Colour	(Yellow) White Green Red Blue	

Invasive Pressures		
Parameter	**Default Selection**	**User Default**
P1 Setup		
Label	(P1) Art CVP PA RAP RVP LAP ICP ABP	
Scale	(200) 0-300	
Colour	Yellow White Green (Red) Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(22) 4-22	
P2 Setup		
Label	(P2) Art CVP PA RAP RVP LAP ICP ABP	
Scale	(20) 0-300	
Colour	Yellow White Green Red (Blue)	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
P3 Setup		
Label	(P3) Art CVP PA RAP RVP LAP ICP ABP	
Scale	(20) 0-300	
Colour	Yellow White Green Red (Blue)	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	

Invasive Pressures		
Parameter	**Default Selection**	**User Default**
P4 Setup		
Label	(P4) Art CVP PA RAP RVP LAP ICP ABP	
Scale	(60) 0-300	
Colour	(Yellow) White Green Red Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
Art Setup		
Label	P4 (Art) CVP PA RAP RVP LAP ICP ABP	
Scale	(200) 0-300	
Colour	Yellow White Green (Red) Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(22) 4-22	
CVP Setup		
Label	P4 Art (CVP) PA RAP RVP LAP ICP ABP	
Scale	(20) 0-300	
Colour	Yellow White Green Red (Blue)	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	

Invasive Pressures		
Parameter	**Default Selection**	**User Default**
PA Setup		
Label	P4 Art CVP (PA) RAP RVP LAP ICP ABP	
Scale	(60) 0-300	
Colour	(Yellow) White Green Red Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
RAP Setup		
Label	P4 Art CVP PA (RAP) RVP LAP ICP ABP	
Scale	(20) 0-300	
Colour	Yellow (White) Green Red Blue	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
RVP Setup		
Label	P4 Art CVP PA RAP (RVP) LAP ICP ABP	
Scale	(60) 0-300	
Colour	Yellow (White) Green Red Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	

Invasive Pressures		
Parameter	**Default Selection**	**User Default**
LAP Setup		
Label	P4 Art CVP PA RAP RVP (LAP) ICP ABP	
Scale	(20) 0-300	
Colour	Yellow (White) Green Red Blue	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
ICP Setup		
Label	P4 Art CVP PA RAP RVP LAP (ICP) ABP	
Scale	(20) 0-300	
Colour	Yellow (White) Green Red Blue	
Digit Format	S/D (Mean)	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(9) 4-22	
ABP Setup		
Label	P4 Art CVP PA RAP RVP LAP ICP (ABP)	
Scale	(200) 0-300	
Colour	Yellow White Green (Red) Blue	
Digit Format	(S/D) Mean	
Sweep Speed	12.5 (25) 50	
Respiration Mode	Spont (Contrl)	
HR Source	(AUTO) ECG Pleth	
Filter Frequency	(22) 4-22	

NIBP		
Parameter	**Default Selection**	**User Default**
Set Cycle Time	1 2.5 3 (5) 10 15 30 60	
NIBP Setup		
Ready Prompt	(5) 0-10	
Inflation Limits	(AUTO) Infant Child Adult	
Colour	Yellow White Green (Red) Blue	

Others		
Parameter	**Default Selection**	**User Default**
C.O. View / C.O. Setup		
Scale	0.5 (1.0) 2.0	
Catheter Type	(1) 2 3 4 5 User	
Injectate Volume	3 5 (10)	
Measurement Mode	Single (Set)	
Colour	Yellow (White) Green Red Blue	
C.O. View / Haemo Calcs / Oxygen Calcs / Calcs Units		
FiO2	(%) None	
Blood Gases	kPa (mmHg)	
Hgb	(g/l) g/dl mmol/l	
O2 Contents	(ml/l) ml/dl	
ATMP	kPa (mmHg) mbar	
Temp Setup		
Unit	(°C) °F	
T1 Label	(T1) Eso Naso Tymp Rect Blad Axil Skin AirW Room Myo Surf	
T2 Label	(T2) Eso Naso Tymp Rect Blad Axil Skin AirW Room Myo Surf	
T3 Label	(T3) Eso Naso Tymp Rect Blad Axil Skin AirW Room Myo Surf	
T4 Label	(T4) Eso Naso Tymp Rect Blad Axil Skin AirW Room Myo Surf	
Display Tblood	YES (NO)	
Colour	Yellow (White) Green Red Blue	

Airway Gas		
Parameter	**Default Selection**	**User Default**
Select Agent	(AUTO) None Hal Enf Iso Des Sev	
Spirometry View / Scaling		
Vol Scale	(AUTO) 300 600 900 1200 1800 2400	
Scaling Speed	(Slow) Fast	
CO2 Setup		
Scale	(6%) 10% 15%	
Unit	(%) kPa mmHg	
Colour	Yellow (White) Green Red Blue	
Sweep Speed	(Fast) Slow	
Rebreathing Alarm	OFF 1% 2% (3%)	
O2 Setup		
Scale	(DIFF6) DIFF10 DIFF15 DIFF30 10-60% 100%	
Measurement	(ON) OFF	
Colour	Yellow (White) Green Red Blue	
Sweep Speed	(Fast) Slow	
Agent Setup		
Scale	1.2% (2.5%) 5% 10% 20%	
Select Agent	(AUTO) None Hal Enf Iso Des Sev	
Measurement	(ON) OFF	
Colour		
Halothane	Yellow White Green (Red) Orange Blue Violet	
Enflurane	Yellow White Green Red (Orange) Blue Violet	
Isoflurane	Yellow White Green Red Orange Blue (Violet)	
Desflurane	Yellow White Green Red Orange (Blue) Violet	
Sevoflurane	(Yellow) White Green Red Orange Blue Violet	

Airway Gas		
Parameter	**Default Selection**	**User Default**
Sweep Speed	(Fast) Slow	
N2O Setup		
Colour	Yellow White Green Red (Blue)	
Measurement	(ON) OFF	
Paw Setup		
Paw Scale	(Loop) 10 20 30 40 60 80	
Colour	(Yellow) White Green Red Blue	
Sweep Speed	(Fast) Slow	
Sensor Type	(Adult) Paedi	
Flow & Vol Setup		
Flow Scale	(Loop) 15 30 45 60 90 120	
Colour	Yellow White (Green) Red Blue	
Sweep Speed	(Fast) Slow	
Sensor Type	(Adult) Paedi	
TV or MV	(TV) MV	
TV Based on	ATPD NTPD (BTPS) STPD	

Recorder		
Parameter	**Default Selection**	**User Default**
Waveform 1	OFF (ECG1) ECG2 ECG3 P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Waveform 2	(OFF) ECG1 ECG2 ECG3 P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Waveform 3	(OFF) ECG1 ECG2 ECG3 P1 P2 P3 P4 PLETH CO2 O2 AA Paw Flow	
Trend Type	(Num) Graph Tab	
Graphic Trend 1	ST (HR) P1 P2 P3 P4 NIBP SpO2 Pleth CO2 O2 N2O AA Resp T1+T2 T3+T4 Tblood PEEP Ppeak Compl MV SO2	
Graphic Trend 2	ST HR (P1) P2 P3 P4 NIBP SpO2 Pleth CO2 O2 N2O AA Resp T1+T2 T3+T4 Tblood PEEP Ppeak Compl MV SO2	
Recorder Setup		
Start on Alarms	YES (NO)	
Waveform Delay	(12 s) OFF	
Trend Resolution	1 (5) 10 30	
Paper Speed	1 6.25 12.5 (25)	
Recording Length	(30 s) Cont	

Display Trends		
Parameter	**Default Selection**	**User Default**
Print Graph / Printer Setup		
Trend Page 1	(ON) OFF	
Trend Page 2	ON (OFF)	
Trend Page 3	ON (OFF)	
Trend Page 4	ON (OFF)	
Trend Page 5	ON (OFF)	
Trend Page 6	ON (OFF)	
Paper Size	(A4) Letter	
Trend Setup / Trend Page 1		
Field 1	OFF (ECG1) HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(HR+Sp)	
Field 3	(P1+P2)	
Field 4	(O2+N2O)	
Field 5	(CO2+AA)	
Field 6	(OFF)	
Trend Setup / Trend Page 2		
Field 1	OFF (ECG1) HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(P3+P4)	
Field 3	(ST)	
Field 4	(T1+T2)	
Field 5	(Tblood)	
Field 6	(OFF)	

Display Trends		
Parameter	**Default Selection**	**User Default**
Trend Setup / Trend Page 3		
Field 1	OFF (ECG1) HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(Sp+Ple)	
Field 3	(Airway)	
Field 4	(MVexp)	
Field 5	(Compl)	
Field 6	(OFF)	
Trend Setup / Trend Page 4		
Field 1	(OFF) ECG1 HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(OFF)	
Field 3	(OFF)	
Field 4	(OFF)	
Field 5	(OFF)	
Field 6	(OFF)	
Trend Setup / Trend Page 5		
Field 1	(OFF) ECG1 HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(OFF)	
Field 3	(OFF)	
Field 4	(OFF)	

Display Trends		
Parameter	**Default Selection**	**User Default**
Field 5	(OFF)	
Field 6	(OFF)	
Trend Setup / Trend Page 6		
Field 1	(OFF) ECG1 HR+Sp P1+P2 P3+P4 NIBP ST Sp+Ple CO2+AA O2+N2O Airway MVexp Compl T1+T2 T3+T4 Tblood SO2 RR+CO2 RR+Sp Event1 Event2 Event3 Event4 Event5 Event6 Event7 Event8	
Field 2	(OFF)	
Field 3	(OFF)	
Field 4	(OFF)	
Field 5	(OFF)	
Field 6	(OFF)	